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Kent Wilson	7, 10, 12, 30, 33.	22, 31.
22, 31.	Chuck Worley	
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Roberta Winne	22, 32, 40.	
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1, 7, 10, 22, 33, 41.	Mr. & Mrs. Gaylord	
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Roger M. Wolffe	Lee Zeller	
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Dr. Al Wood	Robert P. Ziegler	
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John Wood	Joseph A. Ziker Jr.	
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Steve and Gail Woodley	Anthony Zimmerman	
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Bernie Woodruff	Dr. Michael Zimmerman	
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Lucius E. Woods	Richard Zinkel	
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CHAPTER VI MAILING LIST

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Honorable William Armstrong
ASCS Office - Saguache Co
Bureau of Land Management
Bureau of Reclamation
Colo. River Water Conser Dist
Curecanti Natl Rec Area
Dept of Defense, Chairman
EPA, Office of Fed Activ.
Fed Highway Admin -Reg 8
Interstate Commerce Comm
Manti-Lasal National Forest
National Park Service
NRDC, OGC, USDA
Office of General Counsel
Office of Technology Assess
Rio Grande National Forest
Rocky Mtn Exper Station
San Juan National Forest
Secretary of Defense, Envir
U S Army Corps of Engineers
U S Army Engr & Hous Supp Ctr
U S Coast Guard (USCG)
U S Dept of Agriculture
U.S Dept of Energy
U S Dept HUD, Admin VIII
U S Department of Labor
U S Dept of the Interior
U S Dept of Trans, Envir Div
U S EPA Region VIII
U.S. Geological Survey
U S. Navy, Chief of Naval Op
USAF, Envir, Saf & Occ Health
USDA Rural Electric Admin
USDA Soil Conservation Service
USDI Office of Proj Review
USFWS - Colo State Office
Western Reg Fed Aviation Adm
White River National Forest
Honorable Ben Nighthorse Campbell
Honorable Timothy E Wirth

INDIAN TRIBES

Ute Mountain Ute Agency
Ute Museum & Archives
Southern Ute Tribal Council

STATE

CO Dept Natural Resources
CO Div of Parks & Outdr Rec
CO Historical Society
CO Representative Ed Carpenter

CO Representative Margaret Masson
CO River Commission of Nevada
Colo Dept of Highways
Colo State Clearing House
Colorado Div of Wildlife
Colorado Div of Wildlife
Colorado River Bd of Calif
CSFS - State Service Bldg
CSU Documents Department
Dept of Conservation & Nat Resources
Honorable Roy Romer, Governor of CO
Mesa State College
Public Service Co of Colo

COUNTY

Delta Co. Bd of Commissioners
Delta Co Planning Dept
Gunn Co Board of Commissioners
Gunn Co. Chamber of Commerce
Gunnison Co Planning Dept.
Hinsdale Co Planning Commn
Hinsdale Co Bd of Commission
Mesa Co Planning Dept
Mesa County Commissioners
Mesa County Planning Dept
Montrose County Commissioners
Montrose-Gunnison Co Assn
Ouray Co Chamber of Commerce
Ouray Co Bd of Commissioners
Ouray County Commission
Saguache County Commissioners
San Miguel Board of Comm
San Miguel Co Planning Comm.
San Miguel Power Assn.

LOCAL

Town of Collbran
Town of Crested Butte
Crested Butte Chamber of Commerce
Delta Chamber of Commerce
City of Delta
City of Fruita
Grand Jct. Planning Dept.
City of Grand Junction
City of Gunnison
City of Lake City
Lake City Chamber of Commerce
City of Montrose
Montrose Chamber of Commerce
Montrose City Attorney
Town of Mount Crested Butte
City of Naturita
City of Norwood
City of Nucla
Town of Olathe
City of Ouray

Ouray Chamber of Commerce
Town of Paonia
Town of Pitkin
Town of Ridgway
Town of Saguache
Town of Telluride

ORGANIZATIONS-BUSINESSES

Allied Forest Products, Inc
AMA-Colo. Off-Highway Veh Co
American Rivers, Inc
American Ski Federation
American Wilderness Alliance
Blue Mesa Forest Products
Blueribbon Coalition, Inc
Brooks & Brooks
Burkey Lumber Company
Carnick Resources Corp
Celsius Energy Company
Cement Creek Ranch
Chec - Forestwatch
Chimney Peak Ranch
Citizens Task Force
Club 20
CO Assoc of 4WD Clubs Inc
CO Fed of Garden Clubs
Colo Timber Industry Assn
Colo Wildlife Federation
Colorado Assn of 4WD Clubs
Colorado Environmental Coal
Colorado Geological Survey
Colorado Go-4's 4WD Club
Colorado Mining Association
Colorado Mountain Club
West Elk Group Colo Mtn Club
West Slope Group Colo Mtn Club
Colorado Outfitters Assn
Concerned Citizens Res Assn
Continental Div Trail Soc
Crystal Valley Env. Prot Assc
CU Wilderness Study Group
Dames and Moore
DBA 76 Ranch
Denver Mining Finance Co
Donita's Cantina
Double RL Ranch
Doug Jones Sawmill
Elk Meadows Estates
Exxon Company, USA
Forest Trust
Grand Canyon Trust
Grand Valley Audubon Society
Gunn. Cty. Stockgrowers Assoc
Gunn Valley Livestock Assn.
Hedstrom Lumber Company, Inc
High Country Citizens Alliance
High Country News

High Country River Rafter
 Homestake Mining Company
 Hotchkiss Ranches, Inc
 Intermtn Forest Ind Assn
 KPRN
 Leroux Creek Pool
 Louisiana-Pacific Corporation
 MacDonald Resources Engineer
 Mesa Co Cattlemen's Assn
 Mika Agcorp
 Mile-Hi Jeep Club
 Montrose Indust Dev
 Mountain Sun
 National Audubon Society
 National Forest Prod Assoc
 National Wildlife Fed
 Natl. Resource Defense Council
 Natural Energy Resources Co
 Nature Conservancy
 North Fork Hunting Club
 North Fork Water Conserv Dist
 Ouray Co Cattlemen's Assn
 Ouray County Alliance
 Paonia Garage & Sawmill
 Paonia State Bank
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 R D B Forest Products
 Ragged Mtn Reserve
 Redstone Hist Preser Comm
 Region 10
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 Rocky Mtn Chpt Sierra Club
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 Sierra Club Legal Def Fund, Inc
 Sierra Club, Mt Sopris Group
 Sierra Club, Rachel Carson Grp
 Sierra Club, Uncompahgre Group
 Silver World Newspaper
 Sleeping Indian Ranch
 Software Research, Inc
 Spann Ranches
 Spencer Logging
 Sportsman's Resort Sportshp
 Stone Forest Ind , Inc
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 Taylor Park Cattle Assn
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 Todd Logging, Inc
 Triangle Forest Products
 Trout Unlimited
 United 4WD Association
 Western Assn of Land Users
 Western Colorado Congress
 Western Wood Products Assn
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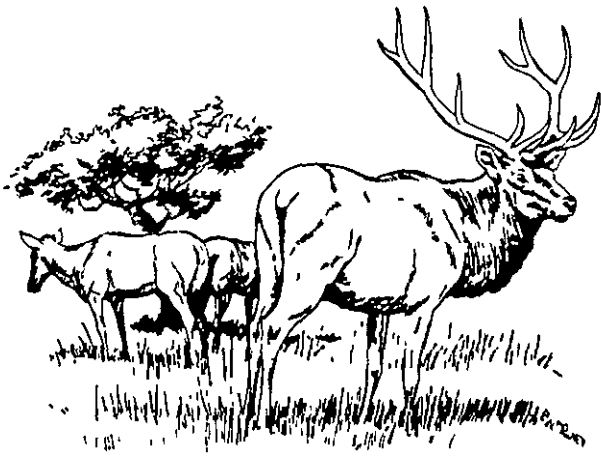
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 Robert P. Ziegler



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APPENDIX A

ISSUES, CONCERNS AND OPPORTUNITIES

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APPENDIX A

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

IDENTIFIED PROCESS

The process is generally said to have been initiated on July 31, 1985, when the Secretary issued a decision on the NRDC appeal of the Forest Plan which had been approved September 30, 1983. The decision identified a number of areas in the planning process related to the timber program where clarification and additional documentation were needed.

Even so, another decision, occurring as part of the Record of Decision (ROD) was already in place and would have provided the stimulus for further reanalysis as well. The ROD stated, "A review of the local demand situation will be made prior to the end of 1987 to determine if local demand for timber has significantly changed. If local demand for timber changes significantly, this Plan will be reanalyzed as required by NFMA Regulations 36 CFR 219.10(c)." The post-Plan introduction of the Louisiana-Pacific waferwood mill had appreciably changed local demand for timber. It was primarily because of this factor that a decision was made to proceed with supplemental environmental analysis and to prepare a significant amendment to the Forest Plan.

The process of implementing the Forest Plan, which had been occurring since September, 1983, also served to define new issues and management concerns which had not been evident during original Plan development. Most of these had their genesis through individual project scoping and public challenge in the form of administrative appeals and most were related in some way to aspen management.

Issues, Concerns, and Opportunities (ICO's) evolved and were identified during the entire period in which the Land and Resource Management Plan was being implemented and subjected to reanalysis, and has continued up to this time through supplemental forums such as the "Keystone Discussions" which are documented in this appendix.

Formal public involvement began in September, 1986, with the completion of an Addendum to Planning Action 1. This was a compendium which displayed Purpose and Need, Issues and Concerns, and Planning Problems that were to supplement the original ICO's identified for the Plan. Public review and comment was invited through Federal Register notification (Exhibit 1), personal letters and news releases. Exhibit 4, is an excerpt of the addendum, and contains a listing of issues and concerns that had been identified up to this point in time.

Additional public participation was solicited throughout the term spanning the reanalysis and Plan amendment analysis, the major elements of which are identified below in the section detailing "Consultation With Others".

**SELECTED
ISSUES/CONCERNS/
OPPORTUNITIES**

During original Plan development, seventeen Forest-wide Planning Questions (now known as Planning Problems) were developed and used throughout the planning process to help develop as well as evaluate the alternatives. In the reanalysis, the following four issues formed the basis for the new Planning Problems:

1. *Timber demand.* As previously explained, this was an issue the Forest had identified in the EIS and ROD. The Secretary of Agriculture also directed the Forest to re-examine the demand for timber and other Forest goods and services.

2. *The USDA decision of July 31, 1985.* The Secretary's decision found that the Regional Forester had not adequately explained his reasons for approving the Forest Plan. It found that the ROD should have addressed three concerns: 1) the rationale for the proposed vegetation management program; 2) efforts to cut costs and raise revenues in the timber management program, and 3) the circumstances under which timber sale levels would be increased during the planning period. The Deputy Chief of the Forest Service clarified the Secretary's decision in a letter dated June 23, 1988.

3. *Below cost timber sales.* While this issue was discussed in the Secretary's decision, it also was an issue of servicewide interest and would have been addressed in the analysis regardless of the Secretary's decision.

4. *Aspen management.* In the Plan, the concern for aspen was minimal since little management in aspen was projected due to low timber demand. However, since a new waferboard plant moved into the area and required large volumes of aspen to operate, the concern over aspen management surfaced.

The original **Planning Question 8** asked, "how should forest products be managed to supply commercial and non-commercial demands on the Forest?" This question was expanded for the reanalysis and the following six Planning Problems resulted.

Planning Problem 8A: Identify the demand for wood fiber and multiple-use benefits on the Forest.

Planning Problem 8B: Determine whether commercial timber sales or non-commercial methods, or a combination of them, will produce the needed multiple-use benefits (other than timber benefits) in the most economically efficient manner.

Planning Problem 8C. Determine whether a "healthy forest" is necessary to produce needed multiple-use benefits, and whether vegetation treatment is necessary for a healthy forest.

Planning Problem 8D: Determine if it is appropriate for the Forest to continue a commercial timber sales program where costs exceed revenues. Determine what will be the impact on the local communities economic stability with this type of program "due to uncertainties over a continuation of a relatively high level of federal funding to support a timber program with costs greater than revenues" (MacCleery).

Planning Problem 8E: Determine if only financially efficient lands should be identified as suited for timber production, or if economically efficient lands should also be included. Decide which lands that are neither financially or economically efficient should be considered and why.

Planning Problem 8F. Determine how aspen should be managed on the Forest. Should it be managed to achieve non-timber multiple-use benefits (only), for wood fiber for industry (only), or for both non-timber benefits and wood fiber?

CONSULTATION WITH OTHERS

Consultation with other agencies, local interest groups, and individuals has been constant throughout the reanalysis and Plan amendment process. It has been carried out through notifications in the Federal Register, open house meetings, personal mailings, news releases, and public forums focused on special interest groups. The following is a synopsis of the major events of public involvement:

- October 3, 1986: Federal Register Notice (Exhibit 1), News releases and personal notification of interested agencies and organizations and 400+ Forest Plan mailing list of availability of draft Addendum to Planning Action 1 (ICO's) and request for comment.
- October 29, 1986: Meeting with all the appellants and intervenors to the appeal of the Forest Plan to review proposed workplan to accomplish the reanalysis and to identify areas of specific concern by participants.
- May, 1987: Notification to Forest Plan Mailing list and interested agencies and organizations, of availability of draft Addendum to Planning Action 3, Inventory Data and Information Collection, for review and comment.
- June, 1987: Notification to Forest Plan Mailing list and interested agencies and organizations, of availability of draft Addendum to Planning Action 2, Planning and Decision Criteria, for review and comment.
- September 2, 1987: Federal Register Notice (Exhibit 2), News releases and personal notification of interested agencies and organizations and 400+ Forest Plan mailing list, of Forest Service intent to supplement the Final Environmental Impact Statement and amend the Forest Land and Resource Management Plan (determination for a 'significant' amendment had not yet been made).
- December 30, 1987: Federal Register Notice (Exhibit 3), News releases and personal notification of interested agencies and organizations and 400+ Forest Plan mailing list, of Forest Service decision to prepare a "significant amendment" to the Forest Plan. Notification of a series of nine "open houses" during late January to inform the public and encourage participation in the Forest Plan amendment process.

APPENDIX A

- January, 1987 Mailing of draft Addendum to Planning Action 4, Analysis of the Management Situation, to interested agencies and organizations for review and comment and use at "open houses".

January 19-22, 1987: Open houses held in Montrose, Norwood, Denver, Delta, Grand Junction, Gunnison and Paonia Colorado. Draft Analysis of Management Situation and other pertinent information made available for participating public.

- June - November 1988: Open dialogue, focused toward selected publics, was also conducted by the Forest. Because of public concern from the local and regional environmental community, the timber industry, state and local governments and economic development interests, a forum was established to attempt to reach a consensus on a preferred alternative for the DSEIS. A private, non-profit facilitator, The Keystone Center, was employed by the Forest to facilitate this process. Numerous work sessions occurred from June through November in an attempt to reach an alternative that all agreed to.

Although concurrence on a preferred alternative was never fully achieved, the various parties agreed that the Forest Service should proceed with the analysis. These work sessions were successful in improving communications and in resolving a number of peripheral issues which facilitate and complement the planning process. They have culminated in a "Report of Agreements and Discussions" (Exhibit 5) which documents the resolution of many issues and identifies a number of issues yet to be resolved.

EXHIBITS 1-3

Federal Register Notifications

Forest Service

Grand Mesa, Uncompahgre, and Gunnison National Forests, Reanalysis of Forest Land and Resource Management Plan

In the Matter of Reanalysis of Forest Land and Resource Management Plan for the Grand Mesa, Uncompahgre and Gunnison National Forests, Delta, Garfield, Gunnison, Hinsdale, Mesa, Montrose, Ouray, Saguache, San Juan, and San Miguel Counties CO, Notice of Reanalysis of the Forest Plan

Pursuant to the September 1983 Record of Decision for the Forest Plan which specified a new timber demand study be completed by the end of 1987

to Deputy Assistant Secretary Douglas W. MacCleery's decision of July 31, 1985, and in response to post Forest Plan issues related to aspen management, the Forest Service, Department of Agriculture is reanalyzing the Forest Land and Resource Management Plan and its alternatives for the Grand Mesa, Uncompahgre, and Gunnison National Forest

The Proposed Action (Forest Plan) and alternatives are described in the Final Environmental Impact Statement (EIS) prepared for the Forest Plan, Chapter II, pages II-15 through II-60. A discussion of the scope of the issues which were addressed in the Final EIS is on pages I-10 through I-14. Public comment on the issues and the Forest Service responses appear in Chapter VI of the Final EIS.

Preliminary issues have been identified since the original Record of Decision for the Forest Plan was signed on September 29, 1983, by the Rocky Mountain Regional Forester. These issues focus on demand for wood fiber on the Forest, treatment of vegetation including aspen to provide non-timber benefits, below-cost timber sales, and the six aspects of the MacCleery decision. These six aspects deal with economic implications of the timber program, the timber program's contribution to net public benefits, timber cost reduction—revenue enhancement, timber demand; land suited for timber production, and again below-cost timber sales.

Preliminary plans call for the above issues to be the main areas involved in the reanalysis. Each has been summarized in Planning Action 1. This document includes specific details on the purpose and need, issues, concerns and opportunities involved. It is available for public review by contacting the Forest Supervisor at the address below.

Federal, State, and local agencies, individuals, and organizations are invited to submit comments on these or other issues which may affect management of the National Forest.

The following state and local agencies and organizations have shown interest in the management of this National Forest, and have been specifically invited to participate in the scoping and subsequent reanalysis:

Montrose County Commissioners
City of Montrose
City of Crested Butte
Louisiana Pacific Corporation
Colorado Timber Industry Assoc.
Southwest Forest Industries
National Forest Products Assoc.
Allied Forest Products
Western Colorado Congress

The Sierra Club
Gunnison County Commissioners
American Wilderness Alliance
Natural Resources Defense Council
Public Lands Institute
Wilderness Society
Colorado Environmental Coalition
High Country Citizens Alliance
National Audubon Society
Western Slope Energy Research Center
Colorado Wildlife Federation
Colorado Division of Wildlife
Delta County Commissioners
Sierra Club Legal Defense, Inc.

Colorado Department of Natural Resources—Current Forest Plan Mailing List

The public involvement activities (including scoping) planned during the reanalysis are detailed in the Action Plan now available to the public. The public will be notified when other documents are available through paid legal notices, news releases, and letters.

The Forest is using the same approach to the reanalysis effort as was used in the first planning effort. Additional documents will follow the "Planning Action" concept established in the original planning process. The Forest anticipates five addendum sections to the following Planning Actions:

1 Addendum to Planning Action 1 (Issues, Concerns, and Opportunities, Purpose and Need, Planning Questions)

2 Addendum to Planning Action 2 (Planning and Decision Criteria) sections on decision criteria for new planning questions, demand determination process, multiple-use identification process, list of identified benefits, FORPLAN analysis process with analysis area and zone identifiers, data base list and anticipated completed data base timeframe

3 Addendum to Planning Action 3 (Inventory Data and Information Collection) sections on Costs and Benefits.

4 Preliminary Results of (1) demand analysis, (2) cost reduction/revenue enhancement studies, and (3) land suited for timber production analysis.

5 Combined Addendum to Planning Actions 4 (Analysis of Management Situation), Planning Action 6 (Estimated Effects of Alternatives), and Planning Action 7 (Evaluation of Alternatives) sections on results of demand analysis, FORPLAN prescription development, relationship between FORPLAN prescriptions and Plan's management area prescriptions, efficiency of timber and nontimber prescriptions, transportation analysis, cost reduction/revenue enhancement studies, land suited for timber production, benchmark analysis, constraint analysis, and effects (including economic) and evaluation of current Forest Plan alternative and other alternatives.

This reanalysis may lead to an amendment of the Forest Plan. An environmental assessment or an environmental impact statement may be required to document the reanalysis. If an EIS is necessary, a Notice of Intent will be published in the Federal Register. This determination is anticipated in September 1987.

Regardless, a new Record of Decision for the Forest Plan for the Grand Mesa, Uncompahgre, and Gunnison National Forest will be issued to respond to the Deputy Assistant Secretary's decision. It is unknown at this time when a new Record of Decision will be prepared.

Gary E. Cargill, Regional Forester, Rocky Mountain Region, is the responsible official.

Please contact Raymond J. Evans, Forest Supervisor, Grand Mesa, Uncompahgre, and Gunnison National Forests, 2250 Highway 50, Delta, Colorado 81416, telephone (303) 874-7691, for further information or to provide comments on the reanalysis.

Dated September 25, 1988.

Raymond J. Evans,

Forest Supervisor

[FR Doc. 88-22411 Filed 10-2-88, 8:45 am]

BILLING CODE 3410-11-M

Delta, Garfield, Gunnison, Hinsdale, Mesa, Montrose, Ouray, Saguache, San Juan, and San Miguel Counties, CO. The Forest Plan was approved September 29, 1983. The Notice of Availability for the EIS, Forest Plan and Record of Decision appeared in the October 14, 1983, Federal Register. A reanalysis of the Forest Plan was required by Deputy Assistant Secretary of Agriculture, Douglas W. MacCleery's decision of July 31, 1985, related to a review of the Chief's decision on an appeal of the EIS and Plan by the Natural Resources Defense Council. A Notice of Intent to Reanalyze the Forest Plan appeared in the October 3, 1986, Federal Register.

The Forest Service has made a preliminary determination that significant changes to timber, water, wildlife, and range resources will occur to the Forest Plan (38 CFR 219.10(f)) based on results of its reanalysis efforts to date. No determination has yet been made as to what the specific changes to the Forest Plan might be. The Forest Service will subsequently make a final determination of significance in a new Record of Decision.

The analysis will concentrate on the following issue areas which initiated the need for a change:

1. USDA decision of July 31, 1985;
2. Below cost timber sales;
3. Timber demand, and
4. Aspen management.

The issues focus on demand for wood fiber on the Forest, vegetation treatment of aspen to provide non-timber benefits, "below-cost" timber sales, and the main points of the MacCleery decision. These six points deal with economic implications of the timber program, the timber program's contribution to net public benefits, timber cost reduction—revenue enhancement studies, timber demand, timberland suitability, and "below-cost" timber sales.

An addendum to Planning Action 1—Identification of Issues, Concerns, and Opportunities, is now available for public review by contacting the Forest Supervisor at the address below.

The Proposed Action (Forest Plan) and alternatives are described in Chapter II of the final Environmental Impact Statement prepared for the Forest Plan (Chapter II, pages II-15 through II-80). A discussion of the issues addressed in the final EIS is on pages I-10 through I-14. Public comment on the issues and the Forest Service responses appear in Chapter VI of the final EIS.

As part of the reanalysis effort the original alternatives will be redesigned to reflect the issues described above. Additional alternatives may be developed. Federal, State, and local

agencies, individuals, and organizations are invited to submit comments on the issues.

The Forest Service is following the requirements in 38 CFR Part 219 for amending the Forest Plan.

Gary E. Cargill, Regional Forester, Rocky Mountain Region, is the responsible official.

The draft supplement to the Environmental Impact Statement should be available for public review and comment by April 1988. The final supplement to the environmental impact statement is scheduled to be completed by September 1988.

Written comments and suggestions concerning the issues and their analysis should be sent to Raymond J. Evans, Forest Supervisor, Grand Mesa, Uncompahgre and Gunnison National Forests, 2250 Highway 50, Delta, Colorado 81416, by September 30, 1987.

Date: August 17, 1987.

S. H. Hanks,

Deputy Regional Forester

[FR Doc. 87-20139 Filed 9-1-87, 8:45 a.m.]

BILLING CODE 3410-11-2

Forest Service

Intent To Supplement the Environmental Impact Statement for the Grand Mesa, Uncompahgre, and Gunnison National Forests Land and Resource Management Plan

The Department of Agriculture, Forest Service will prepare a supplement to the Final Environmental Impact Statement (EIS) and will amend the Grand Mesa, Uncompahgre, and Gunnison National Forests' Land and Resource Management Plan (the Forest Plan) in

Forest Service**Intent To Prepare Significant Amendment to Grand Mesa, Uncompahgre and Gunnison National Forests Land and Resource Management Plan**

The Department of Agriculture Forest Service has concluded the major portion of the re-analysis of the Grand Mesa, Uncompahgre and Gunnison National Forests Plan as required by Deputy Assistant Secretary of Agriculture, Douglas W. MacCleery's decision of July 31, 1985. Re-analysis of the Forest Plan has resulted in a decision to prepare a "significant amendment" to the Forest Plan. The Forest Supervisor is now in the process of developing a significant amendment to the Forest Plan. This process also will result in supplementing the Forest Plan Environmental Impact Statement to present additional information requested by Deputy Assistant Secretary MacCleery.

A Notice of Intent to Reanalyze the Forest Plan appeared in the October 3, 1986 Federal Register. This Re-analysis of the Forest Plan was prompted by a review of the Chief's decision on an appeal of the EIS and Plan by the Natural Resource Defense Council, and by important changes taking place in demand for wood products from these National Forests. The analysis concentrated on the following issue areas:

1. USDA decision of July 31, 1985.
2. Below cost timber sales.
3. Timber demand and
4. Aspen management.

The re-analysis has resulted in a determination that there is a need to change the Forest Plan. Needed changes affect the Forests' timber management program with possible effects on the water, wildlife and range resources of these National Forests. The needed changes are "significant changes" according to the guidelines laid down in 36 CFR 219.10 (f). Consequently, a "Significant Amendment" to the Forest Plan is being developed to reflect the changes needed in the Forests' timber management program.

The Forest Supervisor has been communicating with interested and affected members of the public to determine the scope of the needed changes since October 1986. In continuation of this process, the National Forests will hold a series of nine "open houses" to inform the public and encourage public participation in the Forest Plan amendment process. All open houses will be held from 1:00 PM to 8:00 PM and will take place in the following locations:

1/19/88 Montrose BLM District Office,
2465 S. Townsend Ave., Montrose, CO.
Norwood U.S. Forest Service Office,
1760 Grande, Norwood, CO.
1/20/88 Denver Executive Towers Inn,
1405 Curtis, Denver, CO.
Delta U.S. Forest Service Office, 2250
Highway 50 Delta, CO.
1/21/88 Grand Junction Forest Service
Office, 764 Horizon Dr., Grand
Junction
Gunnison U.S. Forest Service Office,
216 N. Colorado, Gunnison, CO.
1/22/88 Paonia, Paonia City Hall, 214
Grande Ave., Paonia, CO.

The draft amendment to the Forest Plan and supplement to the Environmental Impact Statement are expected to be available for public review and comment in April 1988. The final amendment and supplement are scheduled to be completed in September 1988. Gary E. Cargill, Regional Forester, Rocky Mountain Region, is the responsible official.

Date: December 17, 1987
Raymond J. Evans,
Forest Supervisor
[F R Doc 87-29820 Filed 12-29-87 8:45 am]
BILLING CODE 3310-11-M

EXHIBIT 4

**Current Issues and Concerns
(Appendix B of Planning Action 1)**

APPENDIX B

CURRENT ISSUES AND CONCERNS

The following issues and concerns have been identified by the Forest I.D. team to be addressed in this reanalysis effort. The issues have been grouped under the four major areas discussed on pages 3 and 4 of this document.

1. TIMBER DEMAND

The Record of Decision accompanying the final Environmental Impact Statement and GMUG National Forests Land and Resource Management Plan, dated September 29, 1983, stated that "...A review of the local demand situation will be made prior to the end of 1987 to determine if local demand for timber has significantly changed. If local demand for timber changes significantly, this Plan will be reanalyzed as required by NFMA Regulations, 36 CFR 219.10(c) ...". (Subsequently, a new mill of significant capacity (22-25MMBF) has located in the area. The mill produces waferwood and can use aspen wood fiber which, in the past generated little commercial demand and, because of the lack of market was considered unsuited for timber production.)

"The Chief's decision [for the San Juan] directs the Regional Forester to supplement the record with information on timber demand projections. [in the area]. By this decision the Regional Forester is also directed to discuss in the planning records the circumstances under which increased demands (and presumably increases in timber prices associated with those increased demands) would lead to increases in timber sales offerings (overall sale levels) during the plan period. The effect of projected price increases on economic efficiency and decisions to increase timber sale levels should be discussed as well. If circumstances other than, or in addition to, increases in timber prices may lead to increases in national forest timber sales offerings during the plan period, these circumstances should also be discussed." (MacCleery 7/31/85 letter at page 10, fourth paragraph)

The Natural Resources Defense Council, Inc. (NRDC), letter to the Chief and Regional Forester, dated January 10, 1986 spoke to the following facets of the demand issue.

- A more precise assessment of demand is required.
- What are the effects of the timber program on community welfare and stability?
- Under what condition will an increase in timber demand cause an increase in sale offering?
- What is the demand for GMUG woodfiber products?

The National Forest Products Association (NFPA), in letters to the Chief and John White (WO LMP) dated 1/13/86 and 9/10/85 respectively, spoke to the following facets of the demand issue.

- What provision exists for increasing the timber sale offering if demand increases? This suggests a discussion of the mechanisms for adjusting the timber sale program to reflect market fluctuations.
- Timber demand analysis should provide opportunity for industry's input.

Principal issue facets identified as a result of public review and response to the Draft Addendum to PAI, circulated September, 1986.

- Management activity to promote diversity and combat insects and disease provides a base flow of by-product wood fiber that can meet part of the market demand. Forest lands managed primarily for timber production thus need only make up the difference after gross market demand has been reduced by the by-product timber and the output from private lands.
- Since demand for timber products is so difficult to quantify and may vary widely depending on market conditions, availability of private supply, and new and expanded local mill capacity, each alternative should be able to respond to the range of demand estimates.
- Plan lacks flexibility necessary for adjustments of priorities as demand or conditions change.
- Only if demand exceeds projected capability during some time period is there an opportunity for creditable benefits from additional management activity.
- There is the opportunity for substitution among tree species.
- Planning efforts should consider ways of developing systems of local resource utilization of forest resources which are sustainable, flexibly responsive or adaptive to changing market conditions, and which bring locally the processing of forest resources as close as possible to the final consumer.

2. DEPUTY SECRETARY'S DECISION OF JULY 31, 1985

The six major points of the Deputy Secretary's decision which the GMUG Forest will address during the reanalysis are summarized below. A copy of the Decision letter of July 31, 1985 is located in the planning records. Points pertinent to the 'below cost sales' issue and 'demand' issue have also been restated under those topics.

- a. "The Chief is directed to ensure that the Planning documents provide complete and adequate information concerning the economic implications of the various alternatives..." (MacCleery 7/31/85 letter at page 10, second paragraph; NRDC January 10, 1986 letter, 3rd key element.)
- b. "The Chief is directed to ensure that... the RODs explain clearly why the selected alternative for each Forest is felt to maximize net public benefits." (The Forest relates this to verifying the assumptions behind the "healthy forest" concept necessary to achieve non-timber benefits and thus, 'How non-timber benefits contribute to Net Public Benefit?') (MacCleery 7/31/85 letter at page 10, second paragraph; NRDC January 10, 1986 letter, 4th key element.)

- c. "The ROD and other planning documents should also include a discussion of, or a reference to, the steps that will be taken to reduce timber costs and/or enhance revenues while meeting appropriate multiple-use objectives and dependency needs of local communities." (MacCleery 7/31/85 letter at page 10, third paragraph; NRDC January 10, 1986 letter, 6th key element.)
- d. "The Chief's decision [for the San Juan] directs the Regional Forester to supplement the record with information on timber demand projections. [in the area]. By this decision the Regional Forester is also directed to discuss in the planning records the circumstances under which increased demands (and presumably increases in timber prices associated with those increased demands) would lead to increases in timber sales offerings (overall sale levels) during the plan period. The effect of projected price increases on economic efficiency and decisions to increase timber sale levels should be discussed as well. If circumstances other than, or in addition to, increases in timber prices may lead to increases in national forest timber sales offerings during the plan period, these circumstances should also be discussed." (MacCleery 7/31/85 letter at page 10, fourth paragraph; NRDC January 10, 1986 letter, 2nd key element.)
- e. "The Chief then directs the Regional Forester to supplement the FEIS with appropriate reference to the existence of the Stage II (suitability) analysis in the planning records. This direction is appropriate but insufficient. ...The Forests should discuss the results and implications of this economic analysis in a way that is meaningful to the public and should describe in the planning documents how this information was used in the formulation of alternatives, in the development and selection of prescriptions to be applied to specific lands timber management." (MacCleery 7/31/85 letter at page 10, last paragraph and page 11; NRDC January 10, 1986 letter, 1st key element.)
- f. "This office agrees with appellants that the planning documents for both the San Juan and GMUG provide inadequate information on, or discussion of, the economic implications of continuing and increasing a timber sales program where costs substantially exceed revenues and that the planning documents are not adequately responsive to Departmental policy in this regard. By this decision the Chief is directed to cure this deficiency." (MacCleery 7/31/85 letter at page 11, second paragraph; NRDC January 10, 1986 letter, 5th key element.)

NRDC January 10, 1986 letter (issue facets not covered under issues 1 & 3)

- Analysis needs to include the evaluation and identification of the economic efficiency of specific units of land for a range of timber management intensities.
- Analysis needs to include an evaluation of the economic efficiency of timber and other resource production goals and targets.

- Analysis needs to include an exploration of each of the assumptions behind the Forest Service's initial conclusions that a "healthy forest" is necessary to produce non-timber benefits, that vegetation management designed to achieve a more even distribution of age classes is necessary to provide a healthy forest, and that a timber sale program is the most appropriate way to accomplish such vegetation management.
- Analysis needs to include effects of increased timber sales on the local and national welfare, given that "increased dependency upon submarginal timber sales would seem to result in potentially greater community instability due to uncertainties over continuation of a relatively high level of federal funding to support a timber program with costs greater than revenues".
- Is a healthy forest necessary to produce nontimber benefits?
- Is a more even distribution of age classes necessary to provide a healthy forest?
- What is the most efficient way to obtain nontimber benefits. Is fire an effective and efficient tool?
- Is there a demand for the nontimber benefits attributed to the timber program?
- Where and how is the timber program effective in producing nontimber benefit opportunities?
- Are the nontimber benefits achieved through the timber program worth the cost?
- If the timber program were cut or dropped completely, what high level nontimber benefits would be lost, who would be affected and in what ways.
- What range of nontimber prescriptions will be considered in the reanalysis?
- Is the existing road capacity on the Forest sufficient to meet present and future recreation needs?
- Is cover or forage the limiting factor of GMUG big game herds?
- Is there a correlation between big game population and hunter numbers?
- Which indicator species which do not have major economic importance can be maintained at or above minimum viable population without timber management?
- Which indicator species needs conflict with timber management?
- Are water benefit values in the 1985 RPA gross values for water delivered to the user, or are they values for water produced from the Forest?
- How can we determine the effects on water quality of Forest practices?
- Are fire management costs lower in roadless areas than in areas developed for timber?
- Why are silvicultural remedies needed to deal with insect and disease problems? What social or economic benefits are provided by these practices? Is prescribed fire a better solution? In the absence of positive timber values, are pest problems really problems at all?
- What is the cost of maintaining community stability and is the cost worth that stability?

NFPA September 11, 1985 and January 13, 1986 letters identifying issue facets.

- Is the timber program as currently proposed actually the most cost-effective way to achieve non-timber, multiple-use objectives of the plan? Are there other ways to accomplish vegetation management in a more cost-effective fashion than through the timber program? These questions would seem to require analyses which illustrate the cost of meeting the non-timber objectives of the proposed plan without the use of timber harvest activities.

- Does prescribed fire, used in conjunction with timber sales, hold promise to reduce the cost of vegetation management?
- Are the non-timber, multiple-use benefits to be achieved through the timber program really needed? What are the high-level, non-timber and amenity benefits that would be lost if timber harvest levels were changed and who would be affected by the change and in what ways? These questions appear to require the identification of the incremental, non-timber benefits associated with the timber sale program.

Principal issue facets identified as a result of public review and response to the Draft Addendum to PAI, circulated September, 1986.

- Suitable land determination would be based on the highest demand scenario. A flexible approach such as this would allow the Forest to more easily respond to changes in demand.
- The Forest should reproduce the MacCleery Decision in its entirety and the 6 points of their 1/10/86 letter. These are matters of records.
- The central question raised by the Department's decision, but minimized somewhat by these goals and planning questions, is whether such management is necessary or desirable to achieve multiple-use benefits. The 'whether' question needs more emphasis, particularly in the questions themselves.
- The central issue behind this subject is not 'how many acres, what management tools, and what locations' as suggested by the three planning questions, but whether a healthy forest is necessary to produce needed multiple benefits and whether management is necessary for a healthy forest. To emphasize the importance of these questions, we suggest that the language of the Department's decision about the healthy forest be incorporated directly into the new planning questions.
- Community instability is inappropriately given short shrift. The Department's decision expressly requires an examination of the effects of increased timber sales on the local and national welfare, given that "increased dependency upon submarginal timber sales would seem to result in potentially greater community instability due to uncertainties over continuation of a relatively high level of federal funding to support a timber program with costs greater than revenues". The pertinent language of the Department's decision regarding the above, should be reproduced verbatim as an additional new planning question.
- Economic analysis of suitability of sites for timber harvesting should consider only those costs and benefits that can be valued monetarily.
- Consideration is needed in forest resource planning of alternatives which resource the timber sale program but which also will help to wean vulnerable local communities away from their over dependency upon a diminishing resource base. The plans need to recognize and contribute to the preparation of such communities for painful adjustments to market-place realities and the plans must suggest means for appropriate transitions.
- The forest planning process should shift its focus from resource production to ecosystem maintenance. The intent of forest planning should be first the maintenance of the natural ecosystem integrity within an area and then where possible and compatible the utilization in some way of a resource.
- One of the products of the reanalysis should be a "cookbook" on calculating and displaying the relevant economic and net public benefit especially at the project and perhaps diversity unit levels.

- Documentation is needed through argument and references to show the connection between specific management activities (and especially clearcutting) and the desired benefits to the various multiple resource outputs.
- There is nothing in the law that says all lands "suitable" for timber production must be managed primarily for that purpose. A non-timber emphasis prescription on suitable timber lands merely means that timber yields may be reduced somewhat because of the priority given to other uses. On the GMUG this is no problem since potential timber yield far exceeds market demand. A non-timber emphasis prescription may also lead to somewhat higher harvest costs to achieve the non-timber objectives. The management, market, and economic implications of this latter factor must be carefully examined.
- Timber emphasis is appropriate for a profit making tree farm; but other wise a need for treatment for other uses and management emphasis must be established before a commercial timber sale is selected as the most efficient action.

3. "BELOW COST" TIMBER SALES

The Chief, Forest Service (May 1985 letter to Regional Foresters) recognized the need to reduce costs and increase revenues consistent with multiple use principles and conforming with applicable land management plans.

"The ROD and other planning documents should also include a discussion of, or a reference to, the steps that will be taken to reduce timber costs and/or enhance revenues while meeting appropriate multiple-use objectives and dependency needs of local communities." (MacCleery 7/31/85 letter at page 10, third paragraph)

NRDC January 10, 1986 letter identifying issue facets.

- Analysis should provide for a consideration of ways to reduce costs and/or enhance revenues in connection with the timber program.
- Timber sale program costs are greater than timber sale revenues.
- The Forest is not doing enough to reduce costs and/or enhance revenues in connection with the timber program.
- Where is timber most efficient to manage on the Forest?
- Where on the Forest can timber be harvested without having below cost sales?
- What is the net value of existing timber and what will be the value of regenerated timber?
- For a given alternative what is the cost of the timber program and where will it lose money on existing or second growth stands.
- What is the cost per job of those created or maintained by Forest practices?
- Is it more efficient to produce recreation related jobs or timber jobs?
- Is it more efficient to end a program and relocate and retrain the employees elsewhere?

NFPA September 11, 1985 and January 13, 1986 letters identifying issue facets.

- To what extent can timber program costs be cut and/or revenues be enhanced while still providing an appropriate level of non-timber, multiple-use objectives?
- The examination of opportunities for revenue enhancement and cost reduction should be done within a multiple-use context. Ways to reduce the activity costs used for planning need to be identified and a test of the effects of cost reductions on the non-timber resources should be done.
- An analysis of the sensitivity of the profitability of the timber sale program to cost assumptions may be appropriate.
- A more complete definition of "timber costs" is needed.
- The implications of the below-cost sale issue are of national concern.
- How will the Forest incorporate results of the cost reduction-revenue enhancement studies in the analysis?

Principal issue facets identified as a result of public review and response to the Draft Addendum to PAI, circulated September, 1986.

- The "below-cost" debate may provoke inappropriate management, so called "timber mining", in the name of revenue enhancement, considering the large and valuable inventory of old growth on the Forest.
- An appropriate marketing policy should intend that minimum bids will equal or exceed the direct costs of each sale.
- Both cash-flow and present net value analysis should be undertaken and presented for each commercial activity permitted on the national forests.

4. ASPEN ISSUES

Forest-wide issues summarized from public responses to project level scoping and other public interaction to aspen management since Plan approval on September 29, 1983.

- Aspen clearcutting is good forest management because (a) Clearcutting contributes to Aspen preservation while providing a natural reservoir for harvesting; (b) Aspen harvesting stimulates the local economy; (c) Aspen is a renewable resource; and (d) Clearcutting Aspen can be done without long-term impacts to other resources.
- Aspen clearcutting is not good forest management because (a) Aspen will not disappear from Colorado; (b) Aspen should be dedicated as forest preserves; (c) Clearcutting aspen is not necessary to protect or benefit other forest uses; (d) Clearcutting is not necessary for a healthy, vigorous aspen forest, and (e) Forest Service doesn't have a consistent, overall policy for managing aspen in Colorado.
- The Forest should rely on natural management techniques rather than using a mechanical approach. Would fire management be more productive than cutting in certain cases? Use of prescribed fire is more economical than using commercial harvest.

- The Forest Service is subsidizing large timber corporations for the express purpose of roading roadless areas, undercutting private landowners by low prices for aspen on National Forest lands, and helping industry conspire to restrain and monopolize trade. No leases for timbering should be granted if it results in a monetary loss to taxpayers. Does industry pay market value for aspen? The appraisal system used by the Forest Service should be reformed.
- The analysis should include economic costs and benefits for the following: sale administration; road building; forest timber receipts; water (define value used); posttreatment mitigation, monitoring, and enforcement; changes in economic base and employment; loss of current uses; and other economic benefits other than timber. The reason for a 4% discount rate should be discussed.
- What are the effects of clearcutting aspen on water quality and quantity including the increase in spring runoff effect on stream channels, effect on water supply later on in the fall, decreased low fall flows effect on the local economy, and siltation of the runoff?
- What does the Forest do about cultural resources on the area? Does the Forest have funds to excavate found cultural resources?
- How will clearcutting and resultant slash improve visual quality? Will the public see stumps along highways?
- What are the effects of clearcutting Aspen on game management indicator species? The resultant effects of excessive sprouting on big game movement, and available browse and forage production for big game should be considered. Monitoring should be included.
- What are the effects of clearcutting aspen on non-game management indicator species? The resultant effects on bird populations, species dependent on mature aspen, cavity nesting sites, trunk and crown feeding insectivorous birds should be considered. An acceptable indicator species for mature aspen should be common flicker and associated understory species should be the Lincoln's sparrow. Clearcutting will eliminate cavity nesting sites for 50-80 years. It will probably be 20 years before canopy insectivorous birds such as Warbling Vireos and Yellow-rumped Warblers and at least 50 years before the bird community really begins to recover. Monitoring should be included.
- What are the effects of aspen clearcutting on diversity? If clearcuts are proposed adjacent to existing meadows they will actually reduce diversity.

- Mitigation measures that should be used to protect wildlife value include the following:
 - First and second order streams should be protected by a 50 foot buffer.
 - Leave wildlife trees in clumps of 20 or more, being alive and large.
 - Leave standing dead and mature diseased trees for cavity nestors.
 - Protect clearcuts from livestock until aspen sprouts reach 8-10 feet.
 - Restrict operations in areas identified as critical wildlife habitat during periods of critical use such as fawning (May 15 to July 15).
 - All new roads should be closed immediately upon completion of operations unless justified.
- What are the effects of clearcutting aspen in riparian areas on wildlife? Mitigation measures should include avoidance of area.
- The proposed program is not in compliance with the Forest Plan.
- The analysis should quantify the acres of self-regenerating aspen, non-regenerating aspen; and acres of aspen with conifer invasion.
- What are the effects of clearcutting aspen on the economy of the area? The resultant effects on tourists, ranchers, existing logging operations, town of Olathe, and no action should be analyzed.
- What are the effects of clearcutting aspen on soils, particularly related to sedimentation, roads causing erosion, and mass wasting?
- What are the effects of clearcutting aspen on livestock grazing? The resultant effects of excessive sprouting, grazing acreage reduction, and forage production should be considered. How will regeneration be balanced and coordinated with the needs of livestock grazing?
- Will roads constructed for aspen cutting be closed and reclaimed or will they be open for public use?
- What effects will road use by logging trucks have on the area? Impacts to county roads and bridges, and from dust should be considered. Alternative haul routes should be considered.
- What are the effects of air pollution from Louisiana-Pacific's plant?
- The Forest must consider selective cutting of aspen over clearcutting. What variables affect aspen regeneration after harvesting? At what success rate will each clone regenerate?
- What are the effects of clearcutting aspen on hunting and fishing in the area?
- The analysis should analyze the environmental and economic impacts of other management techniques.

- The Forest Service should reduce the acreage to be cut in any one year in any one watershed to no more than 200 acres. The DOW stated that "operations be planned so as to eliminate simultaneous operations in adjacent drainages".
- What are the effects of aspen clearcutting on irrigation ditches? The resultant effects of slips, slides, mass wasting, flooding over the ditch banks, sediment increase in ditches, and right to motorized access should be considered. The Forest should share the cost and problems if problems arise and can be reasonably attributed to accelerated aspen cutting on National Forest System lands.
- The Forest should harvest bug-infested pine and spruce instead of aspen.
- What are the effects of aspen clearcutting in a semi-primitive non-motorized recreation area?
- Alternatives should be addressed that do not remove aspen.
- An outline plan over time for an identified area is needed.
- Aspen clearcutting may actually increase conifer invasion on some sites.
- The Forest Service, as the lead agency, must ensure that all of the environmental consequences on lands and activities administered by other Federal, State, and local jurisdictions resulting from the proposed action be fully disclosed.
- The Forest Service should try new ways of conducting its public participation efforts. Some new methods to consider are: (1) citizen representatives on Forest Service policy-making bodies; (2) formal public hearings; and (3) surveys of citizens attitudes and opinions.

Western Colorado Congress (WCC), through the process of requesting administrative review of GMUG National Forest aspen treatment project decisions, has identified the following issue facets in their Statements of Reasons.

- Alternatives to aspen treatment and alternative treatment methods must be considered in the analysis of the Forest aspen program.
- Long and short term goals and objectives for aspen management should be described.
- The locations and priorities for management should be delineated.
- The management opportunities and problems for multiple uses should be identified.
- The Forest Plan does not contemplate an aspen program of the magnitude proposed. It does not include a long term program for management. There is no environmental analysis of the program in the final EIS.
- The aspen program must adhere to requirements of law and regulation. NFMA, Section 6(k) forbids unsuitable land from being used for timber harvesting.
- Aspen treatment proposals should only be made when non-timber benefits are shown to be needed through a rational, documented disclosure.

- Economic efficiency of aspen treatment must be displayed. Timber sales must be shown to be the most cost-effective way of achieving non-timber benefits.
- Analysis must describe whether the aspen harvesting will allow for sustained yield over the long run and on what rotational basis the aspen will be managed.
- The Forest aspen program is of significant concern to the public. The Forest Service must thoroughly involve the public throughout the planning and decision making process.
- The Forest Plan needs amended because conditions on the GMUG Forests have changed significantly (demand changed when L-P arrive in the area).
- The effects of the aspen program proposed by the Forest Service should be addressed with more specificity in the Forest Plan EIS. These include socioeconomic, local infrastructure, recreation industry, timber industry, and others.
- The economic effects of the Forest aspen program on private landowners competing to sell their aspen should be analyzed.
- The effects of the aspen program on wildlife, water quality and quantity, air quality, soils, vegetation response and other biologic elements should be analyzed and disclosed.
- The cumulative impacts of the Forest aspen program are not analyzed or disclosed in the Plan.
- The Forest Service plan for aspen clearcutting is inconsistent with the GMUG Forest Plan.
- The Forest Service has inadequately described impacts to other resources and as a result (the Plan) contains inadequate mitigation measures.
- The Forest Service cannot tier to an environmental analysis (the Final EIS for the Forest Plan) that does not exist.

Colorado State University, Department of Forest and Wood Sciences, report on aspen management in the state of Colorado, prepared by Dynamic Horizons, Inc., January 13, 1986.

- the effects of commercial logging on tourism
- the relationship of cutting aspen to improving big game habitat and hunting and fishing revenues.
- The cost comparison of cutting aspen for waferwood or firewood.
- Diversifying the economic base of communities.
- The costs of administering an aspen sale. (Forest Service Concern)
- The effects of distance from the mill and demand for aspen. (Forest Service Concern)
- The cumulative effects of aspen harvest.
- lack of identification of climax or seral stands of aspen prior to the timber sale.
- Forest Plan amendment, revision or re-drafting to recognize the increased demand for aspen.
- Planning for a few large sales or numerous small sales.
- Benefits of cutting aspen, especially water.
- The concerns with aspen are where to cut, how to cut, how much to cut and for what reasons to cut, not process glitches or procedures. (Forest Service Concern)
- Forest Service communication regarding roads in conjunction with aspen sales.

- Communication about managing the aspen for wildlife versus managing aspen for timber.
- Communication about aspen in biological and technical data, with little attention to people's perceptions and feelings about aspen.
- Questionable information presented on Forest Service field trip.
- Public involvement conducted in conjunction with the Forest Plan did not prepare the public for aspen management.
- Amendment of the GM., UNC., GUNN. N. F. plan with adequate public involvement.
- Increasing the elk winter range as the answer to the elk problem of too many animals for the amount of available winter range.
- Support of aspen management to improve wildlife habitat.
- Elk staying longer all year due to increasing hunter pressure on the herds.
- Roads to get to the aspen increasing hunter pressure on herds and increasing people pressures during sensitive calving times.
- Summer range improvement so that the animals come off it in optimum shape.
- Citizen opposition to the cutting of aspen three years ago to increase water runoff.
- Increase of spring runoff not a benefit of cutting aspen.
- Regeneration of aspen in existing stands by keeping the livestock out.
- Regeneration of aspen so thickly after cutting the cattle won't graze in the stands.
- Deer and elk browsing the aspen suckers after cutting.
- Eradication of aspen from private lands by spraying herbicides or root plowing to increase forage.
- Cutting practices that lop the limbs off the aspen and let them lay making it difficult for cattle to graze.
- Importance of aspen to recreational values.
- The relationship between natural regeneration of aspen and livestock grazing within the stands.
- Cutting of large diameter, old aspen as being distasteful to many people.
- The aspen "experience."
- Aspen regeneration after cutting.
- Aspen as both a climax and seral species.
- Treated aspen invading sagebrush.
- All the aspen dying if they aren't cut.
- Acceptability of aspen sales presented to the public on the merits of timber management, not wildlife or water or scenery.
- Alternate species cutting in aspen stands with spruce-fir understories.
- New roads ruining sensitive elk areas.
- Forest Service difficulties in enforcing road closures.
- Roads putting more hunter pressure on big game herds.
- Hauling aspen in the spring tearing up roads.
- Delta county paying for the maintenance of the roads that the haulers use to transport aspen to the mill in Montrose County.
- Harvesting aspen on existing access roads and ripping and obliterating any lateral roads when the job is done.
- Not putting a road on a hillside where it can't be held, even if it means not harvesting the aspen.
- Building roads into the high country to harvest aspen causing the deer and elk herds to stay lower all year thereby increasing damage to crops and orchards.
- Commercial sales discouraging tourism.
- Firewood cutting versus commercial sales.

- Cutting aspen to open up scenic vistas.
- Clearcutting of aspen versus shelterwood cutting.
- Determination of whether or not an aspen stand is climax or seral before it is commercially sold.
- Numerous small sales being more acceptable to the public than a few large ones.
- Acceptability of cutting aspen for firewood.
- Roads used by firewood gatherers.
- The forest plan EIS not identifying air pollution as an off-site impact of managing aspen.

Principal issue facets identified as a result of public review and response to the Draft Addendum to PAI, circulated September, 1986.

- We consistently voice strong support for vegetative management of forests which will increase water yield. We strongly encourage the use of any management methods which could potentially increase water production where opportunities exist.
- I am for the harvesting of mature timber including aspen over 6 inches in diameter.
- I am for more livestock on the Forest to keep the vegetation down, thereby reducing fire hazards.
- Potential exists to enhance and increase the recreation based economy. Priorities should be changed from present commodity based management towards management which will allow increased quality recreation.
- The forests should examine the maintenance and production of high quality water flows as a resource for instream and downstream economic development.
- A partial retention visual quality objective should be standard throughout the Forest except where other designations are specifically justified.
- The reanalysis provides an excellent opportunity to clarify how diversity unit analyses can be used to bridge the gap between project level action and the Forest Plan, neither of which are well suited to multiple-use planning and management. Failure to provide an expanded discussion and additional guidance concerning diversity units can only contribute to future problems.

5. FOREST SERVICE CONCERNS

The Forest Service identified the following concerns in dealing with the various facets of the four issue areas.

- Will treatment through clearcutting meet partial retention visual quality objectives?
- Will existing semi-primitive non-motorized (SPNM) recreation opportunity spectrum (ROS) settings be reduced or eliminated?
- Can indicator species habitat be maintained?
- What are the effects of treatment on the range resource?
- An additional class of aspen should be identified for modeling and analysis. This class could be identified as decadent or noncommercial aspen. Research indicates that certain aspen stands are more readily regenerated by fire than others.
- Stagnated and mistletoed lodgepole pine should be separated from the size classes as these conditions affect timber yield.
- What are the multiple-use benefits that the Forest is managing for? The Forest needs to know the scope of benefits that can be managed for before it can determine what it should be managing for.
- Is it important to manage ponderosa pine for insect and disease control considering its low economic value and lack of demand?
- Is thinning (commercial and noncommercial) an appropriate practice on the Forest?
- What are the aspen management possibilities on the Forest?
 - Meet industry demands only.
 - Meet non-timber benefits only.
 - Meet both of the above.
- What type of management is applicable to the top of the Grand Mesa?
- Where are the specific areas that the public does not want any commercial timber harvesting in?
- What are the collector road construction needs of the Forest to support the timber program?
- Are the benefits from Kuntson-Vandenberg (KV) dollars spent in timber sale areas really needed?
- What can the Forest do to increase bidder competition and subsequently the value of the timber?

EXHIBIT 5

"Keystone Discussions"



GRAND MESA, UNCOMPAHGRE, GUNNISON NATIONAL FOREST
REPORT OF AGREEMENTS AND DISCUSSIONS

December 5, 1988

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GRAND MESA, UNCOMPAHGRE, GUNNISON NATIONAL FOREST

REPORT OF AGREEMENTS AND DISCUSSIONS

December 5, 1988

This Report of Agreements and Discussions, dated this fifth day of December, 1988, is a summary of discussions between the Grand Mesa, Uncompahgre, Gunnison National Forest (The Forest), the Western Colorado Congress (WCC), the Western Slope Energy Research Center (WSERC), the Inter-Mountain Forest Industry Association-Rocky Mountain Division, The Louisiana Pacific Corporation (LP), the Colorado Department of Natural Resources (DNR), and the Colorado Mountain Club (CMC). (Note: The term "environmental/citizen", as used in this document, includes WCC, WSERC, and CMC. The term, "industry", as used in this document, includes Inter-Mountain Forest Industry Association and LP). Additional parties (other than the groups listed above) who participated in the discussions on an occasional basis are listed in Attachment 1. All of the signatories to the Report of Agreements and Discussions are listed on page 21.

I. RECITALS

- A. The Forest is in the process of amending its Forest Plan. To facilitate this process, The Forest initiated discussions among the above participants. The objective has been to resolve as many concerns and issues as possible prior to the preparation of a Draft Supplemental EIS (DSEIS) and Draft Forest Plan Amendment for general public review and comment. The discussions have been facilitated by the Keystone Center, located in Keystone, Colorado.
- B. The participants have met since June 1988 to discuss the issues outlined in this Report of Agreements and Discussions. Many of these issues have been resolved. Those are covered in section II in this Report of Agreements and Discussions. For those issues that were not resolved, the positions of the participants are outlined in section III.
- C. The participants understand that certain of the resolved and unresolved issues will be addressed as elements of the DSEIS and Draft Plan Amendment. These will be subject to public review and comment and possible change by The Forest between draft and final stages of the DSEIS and Plan Amendment. Changes may be made as a result of new information, public comment or changes in statute, and will be documented through the National Environmental Policy Act (NEPA) process.
- D. The participants also understand that some of the resolved issues not addressed in the Final Plan Amendment will be addressed through mechanisms other than The Forest planning NEPA process such as Forest Handbook supplements, budgeting commitments, other internal administrative procedures and policies, or through other (non forest planning) NEPA processes.

- E. The participants agree that adequate funding is critical to the success of the provisions of this Report of Agreements and Discussions. The Forest will advocate its commitments as described in the resolved issues section of this Report of Agreements and Discussions through its normal budget planning process. The participants other than The Forest will advocate the need for such funds at the regional, national, and Congressional levels. Information displaying Forest priorities is provided in Chapter III of the Forest Plan. Once final budgets are received by the Forest, information displaying Forest level priorities will be made available at The Forest Headquarters on allocations of funds by activities.
- F. Nothing in this Report of Agreements and Discussions shall be construed as a waiver by any participant to oppose, in a judicial or administrative proceeding, the lawfulness of the Final Amended Plan.

II. RESOLVED ISSUES

A. Interim Aspen Supply

WCC and WSERC have agreed to amend their agreement with The Forest dated December 10, 1986, titled Settlement Agreement For Middle Point and Pryor Creek Appeals, so as to relieve The Forest of its obligation to sell no more than 1,031 acres of aspen during the fiscal year 1989, providing the timber is legally available. (See Attachment 2.)

Industry expects that The Forest will have a goal of offering 2,500 acres of aspen per year. This goal will continue until the decade limit of 10,082 acres has been met.

The Forest concurs with industry expectations only to the extent that there are available resources, such as manpower and funding, to achieve a program of 2,500 acres per year.

B. Aspen Pricing

The participants recognize that The Forest will raise the price of aspen from its current level of \$1.30/ton to \$1.90/ton.

Support from environmental/citizen participants and industry for the new price is contingent on the provision of adequate documentation and justification by The Forest.

C. Limitation of Timber Sale Size

The participants are concerned that timber sales for all species need to be structured in a manner so as to maintain a viable mix of small and large operators. It is also important that The Forest use existing rules, regulations, and programs to respond to potential changes in market structure or purchaser capability. The Forest must continue to recognize the importance of a viable mix of operators and purchasers for all

species and be able to react to purchaser needs as related to accomplishing land management objectives.

D. Range of Alternatives

The participants support The Forest in proceeding with the development of a range of reasonable alternatives in the Draft Plan Amendment.

E. Road Management

1. The participants agree that The Forest will incorporate into the Plan Amendment the following language regarding road obliteration:

"All temporary roads will be obliterated at the earliest opportunity. Existing open road mileage in project areas will be reduced whenever possible. For all roads left open, an explanation for why they are left open and how they will be maintained will be included in the project Environmental Assessment (EA)."

2. The participants further agree that The Forest will:

- a) Include as a Standard under the Guideline for habitat effectiveness a table or chart to display how habitat effectiveness and road density are related.
- b) Replace the Fourth Guideline under temporary roads with the following:

"All temporary roads shall be obliterated as defined by the glossary to the Forest Plan. Ninety percent of the temporary road mileage obliterated will not have sustained vehicle use three years after obliteration."

Note: The definition in the Forest Plan for obliteration is: "Return a road or trail to production. Simply stated, that means the road or trail will no longer be used or planned for future use as a travel way and will be stabilized and used to produce the same product as the adjacent areas. It blots the road or trail out over time or removes the illusion that the road or trail is to be used as a travel way."

- c) Develop tables to be included in the DSEIS that show the approximate road density on each ranger district which display percent of permanent roads open and permanent roads closed.

F. Sensitive Areas

The participants agree that The Forest will supplement the FSH 2409.18, Timber Sale Preparation Handbook, Chapter 23, so that wet lands, riparian

areas (including water transmission ditches), aquatic habitats, geologically unstable slopes, critical wildlife habitat and cultural resources are protected from resource development activities that would seriously and adversely affect these areas. This supplement will adopt the concepts contained in the document titled Draft Riparian Guidance. (See Attachment 3.)

G. 9A Prescription (Riparian Area Management)

The participants agree that the Draft Plan Amendment will include a revised Prescription 9A (including new or revised standards and guidelines) to insure the protection of riparian areas.

H. 7C Prescription (Management of Forested Areas on Steep Slopes)

The participants agree that The Forest will delete the 7C Prescription.

I. 9B Prescription (Water Yield Through Vegetation Manipulation)

The participants agree that The Forest will delete the 9B Prescription.

J. Monitoring

1. The participants agree that The Forest will include a revised monitoring and evaluation plan in the Draft Plan Amendment. (See Attachment 4 for a Proposed Introduction to the Monitoring and Evaluation Plan.)
2. The participants agree that The Forest will develop and implement a quantitative water quality monitoring program. Such a program will include the identification of one or more watersheds on the Grand Mesa Uncompahgre and Gunnison National Forest where gauging and climatological stations will be installed. Existing data (including forest water quality monitoring reports), public and forest plan issues and management concerns will be utilized to identify needs for the water quality monitoring program.

The method for this water quality monitoring will be one or more of the following:

- a) Monitor water quality before, during and after resource activities.
- b) Monitor water quality parameters on similar treated versus untreated watersheds.
- c) Monitor water quality above and below treatment areas.

The purpose of the monitoring will be to determine treatment effects. Data will be used to identify and correct specific resource problems and improve Forest Plan general direction and standards and guidelines.

The Forest has agreed to implement this monitoring proposal in the interests of reaching agreement among the participants. The Forest takes the position that the gauged monitoring is not the most effective way to utilize forest monitoring dollars and personnel.

3. The participants agree that Forest Plan level monitoring will be funded at a level commensurate with the level of funding provided for program implementation. For example, if timber sales on The Forest are funded at the 90% level for a given year, then The Forest will expend funds on monitoring timber sale impacts in the amount of 90% of the budget requests for monitoring.

K. Package Funding

The participants other than The Forest request that The Forest forward the following recommendation to the Regional Forester and other appropriate officials:

"That management projects be budgeted as multi-year packages. Adequate funding would include all associated costs including updating resource inventories, multi-resource analysis, NEPA documentation, monitoring, mitigation, restoration and accounting for planning and appeal expenses."

The Forest agrees to forward this recommendation to the Region.

L. Forest Plan Implementation

The participants agree that The Forest will supplement the Forest Service Handbook so that there is clear direction on Forest Plan implementation, including multi-resource and project level analysis. The supplement for multi-resource analysis will address the general contents of the document titled NEPA Notebook -- Forest Plan Implementation; Grand Mesa, Uncompahgre, and Gunnison National Forests (see Attachment 5). The supplement for project level analysis should be written with due consideration given to the principles outlined in the document titled NEPA Notebook -- National Environmental Policy Act: Pike and San Isabel National Forest and Comanche and Cimarron National Grasslands. The following two handbooks will be supplemented:

1. FSH 1901.12, Land and Resource Management Handbook, Chapter 50, Implementation; and
2. FSH 1909.15, Environmental Policy and Procedures Handbook, Chapter 10, Scoping; Chapter 20, Environmental Analysis; and Chapter 30, Environmental Assessments and Related Documents.

M. Recreation Opportunity Spectrum (ROS) Direction

With the intent of emphasizing the tie between Recreation Opportunity Spectrum (ROS) and Visual Quality Objective (VQO), the participants agree that The Forest will add the following direction to the Plan.

"(Use the ROS) to inventory the array of recreation opportunities on The Forest and guide management of the physical, social and managerial settings.

Determine effects of project implementation in achieving or maintaining desired ROS objectives for an area. Evaluate proposed project design with regard to ROS Setting Indicators of access, remoteness, visual characteristics, site management, visitor management, social encounters and visitor impacts. Refer to Chapter 63 of the ROS Users Guide.

Maintain the current ratios (plus or minus 10 percent) of primitive, semi-primitive non-motorized and semi-primitive motorized ROS setting acreage on The Forest as directed in the Regional Guide."

N. Inventory

The participants agree that The Forest will provide an overview of its standard inventory systems. The information will describe the kind of inventory, the frequency of data collection and the purpose of the data for the following elements:

1. range condition and trend;
2. riparian area condition and trend;
3. recreational use and trend;
4. biological diversity, especially in terms of its present and prior condition; and
5. population trends of management indicator species and the relationship of these trends to habitat changes.

O. Mapping a Suited Timber Land Base

1. The participants agree that, for the alternative displayed below, The Forest will:
 - a) Map the selected Analysis Areas (AA's) for the first two decades at topographic and 1/4" scale.

- b) Have the Ranger Districts map the proposed commercial timber sale areas for the first decade on the 1/4" map. They will generally overlay the AA's mapped above.

Sawtimber

conifer	29,600 mbf
aspen	1,300 mbf

POI

conifer post and pole	1,000 mbf
aspen miscellaneous products	300 mbf
aspen waferwood	28,000 mbf
conifer waferwood (lodgepole pine)	<u>3,100 mbf</u>

63,300 mbf

OAC

conifer sawtimber	7,000 mbf
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(The willingness of the environmental/citizen participants to have The Forest proceed with the above mapping does not imply any endorsement of the above alternative or the mapping of any single alternative.)

- Once the maps are provided, the participants will have the opportunity as soon as possible to review and comment on both the proposed suited lands and proposed commercial timber sale areas. The final results should display the suited land base for the first two decades and the commercial timber sale areas for the first decade. This is usually updated annually to reflect more accurate scheduling and locations as they become known through inventory and on-the-ground reconnaissance. (The suited land base will not change without a Forest Plan Amendment.)

P. Public Involvement Regarding Suited Timber Land Base

The participants agree that The Forest will schedule timely public involvement opportunities on each ranger district and at Denver during the comment period on the Draft Plan Amendment. The Forest will display maps showing the suited timber land base for the first two decades, commercial timber sale areas for the first decade and proposed arterial and collector roads to access these sales. These maps will remain available for public review throughout the comment period on the Draft Plan Amendment. Throughout this period, The Forest will encourage members of the public to enter written comments into the record.

Q. Multiple Use Advisory Committee

The participants agree that The Forest will initiate the process to empanel a formal advisory committee that is representative of a cross-section of the community, per Title 1300 of the Forest Service Manual. The objectives of the advisory committee should be:

1. to advise the Forest Supervisor in the implementation and evaluation of the Amended Plan;
2. to provide a forum for discussing policy matters and/or management concerns that may be raised by either the Forest Service, the advisory committee or the general public; and
3. to promote communication between the Forest Service, local residents, forest users and the general public.

R. Interdisciplinary Team Participation

The participants agree that the Forest Service will allow any interested member(s) of the public to participate with interdisciplinary (ID) teams at both the forest and ranger district level. The ID team leader is responsible for determining who will be involved and when that involvement will take place. The Forest will make an effort to ensure that the people who have expressed an interest in National Forest management are informed of opportunities to participate with ID teams.

S. Training Program

1. The participants agree that The Forest emphasize the importance of timber sale preparation and design. Yearly training sessions will be held to insure marking crews and timber sale layout Foresters understand the Forest Plan as well as the need for economically and environmentally sound sale design. To that end, the non-Forest participants offer to provide expertise for any training session The Forest schedules.
2. The participants agree that The Forest will institute a training and review program for Forest employees on implementation of the Amended Plan, including, but not limited to, the following:
 - a) an initial workshop following the issuance of the Final Plan Amendment at which time those employees responsible for multi-resource analysis and project planning implementation are exposed in a classroom situation to the new handbook supplements and other management direction;
 - b) an annual workshop to introduce employees to new material as it is developed;
 - c) an annual meeting of The Forest ID team to specifically discuss The Forest monitoring and evaluation plan and to prepare the annual monitoring and evaluation report for the past year and the next year's annual monitoring work program;

- d) field season functional workshops in association with the annual monitoring program to ensure compliance with existing direction; and
- e) on-going review of multi-resource analysis and NEPA documentation to assure compliance with policy and procedures and to assure prudent land management.

III. UNRESOLVED ISSUES

A. Financial Efficiency

(The issue is under what circumstances and with what justification timber sales should be offered that result in an excess of direct costs over benefits.)

1. Environmental/Citizen: The environmental/citizen position is that The Forest should declare as unsuited for timber production those lands that cannot support timber sales that, taking into account all direct benefits and costs as defined in 36 CFR 219.14(b)(1) and (2), result in an excess of costs over benefits. The environmental/citizen participants note that the National Forest Management Act (NFMA) allows exceptions for sales to be made even from unsuited lands for salvage and multiple use purposes. They do not contest these exceptions so long as multiple use sales are fully justified in light of the MacCleery decision.

The environmental/citizen participants feel that The Forest should map the financially efficient alternative in the Draft Amendment.

2. Industry: Industry understands 36 CFR 219.14 B (1) and (2) to be one step in the process to designate suitability, but not the sole test of suitability. Rather, one must follow the entire four step process prescribed in 36 CFR 219.14 A, B, C, and D. This process requires The Forest to examine all forest lands in light of all proposed management activities and to develop a management alternative that provides the most economically feasible array of multiple uses.

Finally, industry believes that all proposed management activities need to be examined in light of costs and benefits so that the public can fully understand the proposed alternative.

3. State: The State agrees that The Forest needs to examine the financial and economic consequences of all management activities. If the standard that costs should not exceed revenues is applied to timber sales, it should also be applied to recreation and other uses of The Forest. However, this requirement may restrict many consumptive and non-consumptive uses of The Forest which may not be financially efficient but may provide a public benefit.

As a way to rank tracts for potential timber sales, The Forest should evaluate the direct benefits and costs of timber sales. Perhaps this analysis could be provided as part of the information package for a particular sale.

B. Net Public Benefits

(The issue is how The Forest analyses and accounts for the total benefits and total costs of National Forest management over time.)

Participants other than The Forest: The participants other than the GMUG Forest recommend that The Forest consider and analyze all anticipated benefits and all costs, monetary and otherwise, of any management proposal or program, recognizing both the difference between current operating costs and long-term investments as well as benefits and costs not readily quantified in dollars. The participants other than the Forest also recommend that The Forest develop a cost accounting system that clearly identifies the costs of forest planning, appeals and litigation.

C. Water Benefit

(The issue is whether water should be counted as a benefit from timber management.)

1. Environmental/Citizen: The environmental/citizen position is that The Forest should eliminate water benefits as an addition to the value of timber. Further, water benefits should be eliminated in the benchmark runs and in the calculation of Present Net Value (PNV). The reasons for this position are fourfold:

- a) Water benefits being proposed by The Forest are based on a number of unverifiable assumptions and are admittedly extremely soft. The principle benefit dollars from increased water yield come from hydropower production and salinity reduction and are based on incomplete factors and conditions which could easily change and would lead to significantly different results.
- b) Other costs and benefits of timber management are not part of The Forest's PNV calculations. If the benefits of increased water yield from timber harvesting are to be quantified, so should the opportunity costs of amenity services precluded by timber harvesting.
- c) Although all other Resource Planning Act (RPA) and forest planning resource values are values of the goods in the forest - that is, not delivered to the consumer - the Forest Service has made no attempt to adjust its water values. Using delivered water values (i.e., the value of water to irrigators, hydropower producers, etc.) might be equivalent to using, for timber, the value of lumber sold

to home builders or, for recreation, the total amount spent by recreationists on equipment, food and transportation.

- d) Colorado law clearly states that an entity cannot claim water from cutting down phreatophytes. No legal entitlement to the increased flows can be acquired and, thus, no direct benefits from such flows can be claimed.

- 2. Industry: Industry believes water quantity is critical to the Colorado river basin and that The Forest needs to consider its value when analyzing proposed management activities.

In light of 1) statements in The Forest Analysis of the Management Situation (AMS) that indicate a need for extra water in the Colorado river basin; 2) statements in the recent draft national RPA assessment that identify the need for additional water quantity in the Colorado river basin; and 3) a recent Newsweek magazine article (October 31, 1988, page 58) that reports water values in excess of 5000 dollars per acre foot in Colorado; industry believes that the current value used in forest plan analysis may be too low. Timber harvests are a management activity that can be used to increase water yields. Any analysis of timber management must include examination of increased water yield costs and benefits.

- 3. State: The State concurs with WCC's position on this issue relevant to the Forest Plan. Including the value of water in the economic decision of whether or not to make a timber sale will only serve to bias the decision in favor of making a sale without a tangible benefit for water.

Our understanding is that the forest planning process is to place primary emphasis on the impacts of forest management practices to the forest and the immediately adjacent region. Therefore, the cost of water on the eastern slope of Colorado, in Arizona or in California should not be allowed to unduly influence forest management on The Forest.

- 4. Forest: The Forest's position is that the Regional Office has provided direction to the Forest to consider water benefits as valid priced benefits in the analysis. The Forest based its water values on a report to the Rocky Mountain Region titled Marginal Economic Value of Runoff from the Grand Mesa, Uncompahgre, and Gunnison National Forests dated 26 May, 1988 and written by Thomas C. Brown from the Rocky Mountain Forest and Range Experiment Station.

D. 4D Prescription (Aspen Management)

(The issue is what management emphasis applies to this prescription and whether or not sufficient multiple use justification exists to harvest aspen for non-timber benefits.)

1. Environmental/Citizen, Industry and the State: The environmental/citizen, industry and State participants recommend that The Forest accurately document and justify the reasons for proposed management activities. They are concerned that the 4D prescription may not realistically reflect the need to manage aspen for fiber production.
2. Industry: Industry recommends that The Forest modify the 4d Prescription to give co-equal weight to the following management goals: wildlife habitat, fiber production and visual quality. Or, The Forest should analyze all aspen acres, drop the 4d land allocation and redesignate aspen acres into the 4b, 7 and 6b land allocations.
3. State: The state believes that reclassification of the 4D land allocations into 4B, 7 or 6B categories will provide a more concise signal regarding the management objectives for a particular tract of land. Each tract should be analyzed for the best use of its resources. The preferred management use should be clearly communicated and balanced with alternate uses in adjacent areas. Simply modifying the 4D prescription will make the distinctions between objectives less clear than a direct designation of lands for habitat, fiber or livestock uses.

E. Allowable Sale Quantity (ASQ) Analysis

(The issue is what process and analysis should be used to determine an ASQ for the Plan Amendment.)

1. Environmental/Citizen: The environmental/citizen position is that The Forest may be setting future timber harvest levels based on inadequate data, and that planners may be making dubious assumptions to substitute for that data. (See Attachment 6, WCC memo of October 25, 1988.) WCC cannot support any ASQ for the Final Amended Plan until a complete package of environmental protection and environmental compliance measures is assembled, and until a thorough analysis of proposed ASQ levels is completed. In setting an ASQ, WCC also believes that:
 - a) The Forest should make separate allowable cut calculations for each of the three forests;
 - b) timber should not be harvested until it reaches its maximum average annual growth or culmination of mean annual increment;
 - c) The Forests's future timber management plans should strictly conform to "non-declining flow", the policy of selling no more timber today than can ever be sold in the future;
 - d) The Forest should calculate timber sale levels using the same measure of wood that it uses to sell the wood; and

- e) assuming The Forest can arrive at an ASQ that is physically sustainable, it may need to be reduced somewhat because timber sale levels that are physically sustainable may not be economically sustainable.
2. Industry: Industry's position is that, in developing different ASQ levels, The Forest needs to consider existing demand as well as potential future demands. In setting the ASQ, industry also believes that:
- a) a policy of non-declining flow should be followed;
 - b) existing timber demand be met so long as that demand level is biologically feasible;
 - c) any potential future demand be addressed through the use of an opportunity Availability Component (OAC); and
 - d) The Forest should maintain its use of one ASQ for the administrative unit, thus avoiding unneeded changes to the budget and reporting systems that presently exist.
3. State: The State believes that future ASQ levels must be based on existing demand, as well as projected future demands. This ASQ level should be met in areas where regeneration can occur and avoiding areas such as old growth stands where climatic changes will prevent new growth. Areas should be avoided where the maximum average annual growth has not been achieved. The ASQ should be regarded as a target, not an expectation, that will be achieved only if it is biologically feasible, the environmental protection and compliance considerations and processes mutually agreed to in this Report are followed, and the appropriate budget is available for planning, sales, and implementation of the agreements in this Report.

F. Standards and Guidelines

(The issue is how to revise the standards and guidelines for inclusion in the Plan Amendment.)

1. Environmental/citizen: The environmental/citizen position is that standards and guidelines are judicially enforceable requirements that restrain the Forest Service's resource development activities. The environmental/citizen participants believe that numerous revisions are needed in the standards and guidelines in the Forest Plan. On June 25, 1988, WCC submitted a memorandum to The Forest in good faith commenting on certain of the standards and guidelines contained in the Forest Plan (see Attachment 7). WCC believes The Forest needs to respond in writing to the recommendations in this letter by revising, adding or deleting certain standards and guidelines or justify its failure to do so.

2. Industry: Industry understands that standards and guidelines are being revised, and all interested participants will be given ample opportunity to comment on the proposed changes after the Draft Plan Amendment is published.
3. Forest and State: The Forest and State agree that a revision of standards and guides has already been undertaken. Those changes, which are appropriate, will be included in the Draft Plan Amendment. Rather than making a unilateral response to concerns which may have already been addressed, The Forest asks WCC to comment on the standards and guides as they appear in the Draft Plan Amendment.

G. Biological Diversity

(The issue is how to preserve and enhance biological diversity on The Forest.)

1. Environmental/citizen: The environmental/citizen participants believe that biological diversity may be the single most important resource in our national forests. With the passage of the National Forest Management Act (NFMA) in 1976, Congress mandated the protection of biological diversity as a major objective for the National Forest System. The law states that forest plans should "provide for diversity of plant and animal communities...". In WCC's opinion, current Forest Service programs and policies are inadequate to protect the biological wealth of the national forests. Moreover, if the Forest Plan is any indication, the current planning process will not correct these problems.

The environmental/citizen participants believe that The Forest is required by law and regulation to consider biological diversity throughout the planning process (36 CFR section 219.26) and to develop quantitative measures of diversity. To the extent practicable, and consistent with the overall objectives of multiple use, it must preserve and enhance biological diversity so that it is at least as great as that of a natural (unmanaged) forest.

The environmental/citizen participants recommend that The Forest should review the report titled National Forests -- Policies for the Future: Volume 2, Protecting Biological Diversity and results, if any, of national negotiations on biological diversity. If, through these reviews, areas of concern in agency process, data or program direction are identified, then The Forest should consider incorporating appropriate changes into the Forest Service Manual and Handbooks, the Forest Plan and other pertinent management documents.

2. Industry and the State: Industry and the State believe all participants had identified this issue as one that is currently being dealt with at the national level. We also believe The Forest should address this issue in future iterations of the Forest Plan after the national effort provides direction.

3. Forest: The Forest's position is that this issue is the subject of a national level Forest Service policy review and is not appropriate to address at this administrative level at this time.

H. Watershed Protection Strategy

(The issue is what overall strategy for water quality protection should be adopted by The Forest.)

1. Environmental/citizen: The environmental/citizen position is that The Forest's current strategy for water quality protection casts considerable doubt that future resource development activities will not adversely affect water quality and fisheries. We believe The Forest's strategy for addressing water quality problems in the Forest Plan is seriously flawed. The Forest improperly assumes the reliability and effectiveness of using best management practices to lessen the adverse effects of resource development on watershed resources. Moreover, The Forest's approach fails to take into account the relative economic values of timber and watershed resources.

The environmental/citizen participants recommend that The Forest adopt a watershed protection strategy which gives due consideration to the principles and methodology outlined in the publication National Forests -- Policies for the Future: Volume 1, Water Quality and Timber Management. The strategy should be adopted through the NEPA process, with full public participation, and should be subject to an administrative appeal. The Forest should implement such a strategy through the Forest Service Manual and Handbooks, the Forest Plan and other pertinent management documents.

2. Industry: Industry believes the new standards and guidelines currently being developed need to be reviewed in order to assess The Forest's watershed protection strategy. Also, that current state and federal laws along with other rules and regulations provide adequate protection.

Until specific examples of watershed degradation can be documented, we question the need to modify the current strategy.

3. State: The State recommends that The Forest adopt a watershed protection strategy which gives due consideration to the principals of water quality and timber management. The new standards and guidelines currently being developed need to be reviewed in order to assess the effectiveness and adequacy of The Forest's watershed protection strategy in light of existing state and federal laws. Where appropriate, revisions should be made in the Forest Plan subject to the provisions of NEPA, or administratively through the Forest Service manuals and handbooks.

I. Deferrals and Exclusions

(The issue is what areas on the Grand Mesa Uncompahgre and Gunnison National Forest should either be excluded from the timber base or deferred from management activity, and when these exclusions and deferrals should be considered.)

1. Environmental/citizen: The environmental/citizen participants believe that the following areas should be excluded from the suited base in the Amended Plan:
 - a) the Kebler Pass Corridor and the north facing slope of the Mount Sneffels Range from North Pole Peak to White House Mountain, as these areas are depicted in the Map of Exclusions Requested by WCC (see Attachment 9); and
 - b) the Kannah Creek, Roubideau and Tabeguache RARE II areas.
2. Industry: Industry expects The Forest to maintain the availability, for consideration, of all tentatively suited lands until the proposed suited land base and proposed ten year harvest schedule can be examined.

If The Forest proposes management activities in the Kebler Pass corridor, north facing slopes of the Mount Sneffels Range from North Pole Peak to White House Mountain, Kannah Creek, Roubideau Canyon and the Tabeguache area, industry requests proposed management activities be deferred until the last three years of the first decade. All other former RARE II areas should be considered for proposed management activities.

3. State: The purpose of developing this Report of Agreements and Discussions is to establish a process for identifying a reasonable ASQ, suited lands for timber sales, environmental guidelines for timbering and an economic rationale for all decisions. The effectiveness of this Report is contingent upon the trust all parties place in this process. If the terms of this Report are met, the State believes that the issues surrounding the areas identified for deferrals and exclusions will be debated through the process described herein, and the appropriate restrictions will be imposed. Therefore, identification of specific tracts for deferral or exclusion should not be necessary. If the environmental protection conditions of this Report are not followed, such identification would be justified.

J. Steven's Gulch

(The issue is whether or not to reclassify land in the Stevens Gulch area, and when to consider this issue.)

1. Environmental/citizen: The environmental/citizen position is that The Forest should reclassify in the Plan Amendment the Prescription

7E lands to the west of the Hayden Curecanti powerline and south of the Overland Reservoir within the Steven's Gulch EIS project area to a Prescription 3A except that temporary roads should be allowed for the administration of the proposed Hubbard #2, Cow #2 and Cow #3 timber sales and for normal maintenance of the overland ditch.

2. Industry: Industry's position is that this issue was only recently raised in the Keystone process and should be dropped. We oppose any proposal that alters land allocations from fiber production to non-road use allocations after road investments have been made. The Forest should implement its proposed management activities once the issue clears the administrative appeals process.
3. Forest: The Forest's position is that this issue has been decided through the administrative appeals process.
4. State: The purpose of this Report of Agreements and Discussions is to identify the terms and conditions under which timbering could occur in the Grand Mesa, Uncompahgre and Gunnison National Forest. The State does not believe that individual sales should be part of this Report. It is the States' understanding that planning for the Steven's Gulch sale should occur after this Report is signed. It is the State's hope that the merits of the Steven's Gulch sale will be compared to the conditions in this Report, and that appropriate concerns and restrictions will be addressed at the time of detailed planning. (See Attachment 9 for a copy of a letter from the State to the Chief of the Forest Service on this subject.)

K. Charter for the Multiple Use Advisory Committee

(The issue is how often the Multiple Use Advisory Committee should meet, and whether a recommendation should be made now or left up to the participants of the Multiple Use Advisory Committee.)

1. Participants other than The Forest: The participants other than The Forest recommend that, in the development of its charter, the Multiple Use Advisory Committee consider meeting at least semi-annually and should consider, among other things, reviewing The Forest's annual work program and monitoring and evaluation report.
2. Forest: The Forest feels that because a charter must be drawn up by the Committee participants, it would be inappropriate at this time to stipulate meeting periodicity, etc., with too much specificity.

L. Harvesting on Steep Slopes

(The issue is whether or not, and under what circumstances, timber should be harvested on steep slopes.)

1. Industry: Industry believes that steep slopes (more than 40 percent) should not be automatically excluded from the suited base. Standards and guideline should be developed for managing acres over

40 percent, taking into consideration factors such as soil stability. Where applicable, areas in the present 7C Prescription should be moved into other land allocations including the 7 Prescription.

2. Environmental/citizen: The environmental/citizen participants believe that any land that was previously classified in a 7C Prescription in the Forest Plan should not be included in the suited base in the Amended Plan.

M. Adequacy of The Forest's Visual Quality (VQO) Objective and Recreation Opportunity Spectrum (ROS) Systems

(The issue is whether or not the Forest Service's Visual Quality Objective (VQO) and Recreation Opportunity Spectrum (ROS) planning systems are adequate to protect visual and recreational resources both now and in the future.)

1. Environmental/citizen: The environmental/citizen position is that the VQO planning system imposes legal limits on the use of the National Forests. Once VQOs are established in the forest plan, these limitations apply to proposals for ski resorts, mining, timber harvesting, and other commercial uses that operate under permit or contract. WCC also believes that by zoning an area as a particular ROS class that the Forest Service must exclude activities from the area that are inconsistent with providing the features associated with that ROS class. At this time, the Forest Service has not provided enough information for the environmental/citizen participants to determine whether or not visual and recreational resources will be adequately protected.

The environmental/citizen participants also note that, according to The Forest, 56% of the Grand Mesa, Uncompahgre, Gunnison National Forest lands are classified as having a VQO of "modification". Under this objective, management activities may visually dominate the original characteristic landscape. We believe that having this much land classified as "modification" is unacceptable. A VQO of "modification" should be the exception and not the rule on the Grand Mesa, Uncompahgre, Gunnison National Forest.

N. Training for Sale Layout and Administration

The environmental/citizen participants believe that The Forest should employ personnel certified in silvicultural practices for timber sale layout and administration.

O. Interim Timber Supply

Industry maintains there is a need for sufficient volumes of timber to be offered for harvest until the final decision is made on the forest plan amendment.

IV. WORKPLAN

The following workplan will govern the implementation of the resolved issues described in this Report of Agreements and Discussions. Unresolved issues described in this Report of Agreements and Discussions will be addressed by The Forest as public comment in the Final Supplemental Environmental Impact Statement.

<u>Issue</u>	<u>What Needs Doing</u>	<u>When</u>
A. Interim Aspen Supply	Sign amendment to original agreement	Concurrent with signing this Report of Agreements and Discussions
B. Aspen Pricing	Raise aspen price	Sometime after this Report of Agreements and Discussions is signed. Industry would prefer not until after Final Plan Amendment.
C. Limitation of Timber Sale Size	Maintain viable mix of small and large operators	Ongoing
D. Range of Alternatives	Present range of alternative	In Draft Plan Amendment
E. Road Management	Add/change language and add tables	In Draft Plan Amendment and DSEIS
F. Sensitive Areas	Supplement handbook	As soon as possible after Draft Plan Amendment.
G. 9A Prescription	Revise Prescription	In Draft Plan Amendment
H. 7C Prescription	Drop Prescription	In Draft Plan Amendment
I. 9B Prescription	Drop Prescription	In Draft Plan Amendment
J. Monitoring	Revise Monitoring Plan	In Draft Plan Amendment
	Develop quantitative water monitoring program	After Final Plan Amendment
	Obtain funding for monitoring	Next budget process after Final Plan Amendment

K. Package Funding	Send recommendation to Region	After this Report of Agreements and Discussions is finalized
L. Forest Plan Implementations	Supplement handbooks	After Final Plan Amendment.
M. ROS Direction	Add direction to Plan	In Draft Plan Amendment.
N. Inventory	Describe inventory	Between Draft and Final Plan Amendments
O. Mapping a Suited Timber Land Base	1a. Map AAs	By November 29, 1988
	1b. Map timber sale area	By November 29, 1988
	2. Participants review maps	On November 29, 1988
P. Public Involvement Regarding Suited Timber Land Base	Public involvement	During the public comment period on the Draft Plan Amendment
Q. Multiple Use Advisory Committee	Initiate process to set it up	Between Draft and Final Plan Amendments
R. ID team Participation	Interested parties participate	Ongoing
S. Training program	1. Sessions for sale layout foresters	Annually
	2a. Conduct workshops on Final Plan	After Final Plan Amendment
	2b. Annual workshop on new material	Annually
	2c. Annual ID team meeting on monitoring	Annually
	2d. Field workshops on monitoring	Annually
	2e. Review of multi-resource analysis and NEPA documentation	Ongoing

V. SIGNATURE SHEET

The Forest and the other participants intend to perform their respective commitments as described in the Resolved Issues section of this Report of Agreements and Discussions.

Hamlet J. Barry
Signature

COLORADO DEPARTMENT OF NATURAL RESOURCES
Organization

DECEMBER 15, 1988
Date

Hamlet J. Barry, III
Executive Director

Colorado Department of
Natural Resources

S.R. Broome
Signature

EXECUTIVE DIRECTOR, REGION 10
Organization

12.27.88
Date

S.R. Broome
Executive Director

Region 10 League for
Economic Assistant and
Planning

Raymond J. Evans
Signature

U.S.D.A. Forest Service, GUNNISON N.F.
Organization

12/8/88
Date

Raymond J. Evans
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ATTACHMENT 1

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on an Occasional Basis

Parties who Participated in the Discussions
on an Occassional Basis

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Colorado Department of Wildlife

Colorado Environmental Coalition

Colorado Wildlife Federation

Congressman Ben Nighthorse-Campbell's Office

Delta County

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National Forest Products Assoication

Region 10 League for Economic Assistance and Planning

San¹Juan National Forest

Solar Age Enterprises

Spencer Lumber

Stone Forest Industries

United States Forest Service, Region 2

APPENDIX B

DESCRIPTION OF ANALYSIS PROCESS

APPENDIX B
DESCRIPTION OF THE ANALYSIS PROCESS

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I. INTRODUCTION

Appendix B describes the analysis process used in developing the Forest Plan Amendment. The Appendix focuses on the quantitative methods used to perform the analysis and documents the methods used to conduct the analysis.

Overview of the GMUG Forest Planning Problem

The Final Supplemental Environmental Impact Statement (FSEIS) presents a range of timber management alternatives and displays in detail the effects of each alternative that was considered. The Forest Plan Amendment describes in detail how the FSEIS "Proposed Alternative" will be implemented.

The different individual and group preferences as well as the physical, biological, and legal forest timber management limits are reflected in the issues and concerns which guide the amendment. Forest resource uses and development opportunities suggested by Forest Service managers also guide the amendment. The issue development process is discussed in detail in Appendix A of the FSEIS.

Public interest includes divergent viewpoints about the use of market commodities (timber and grazing) and nonmarket resources (unroaded recreation, scenery, wildlife, old growth, and habitat diversity). The objective of the amendment analysis is to provide enough information to help decision makers determine which combination of goods, services, and land uses relating to timber management will maximize net public benefits. (The concept is further discussed in Section IV Appendix B.) The National Forest Management Act (NFMA) and its implementing regulations (36 CFR 219) provide the analytical framework for the analysis. The requirements of the National Environmental Policy Act (NEPA) (40 CFR 1500-1508) also apply to the analysis process.

During the original Plan development, seventeen Forest-wide Planning Questions (now known as Planning Problems) were developed and used throughout the planning process to help establish and evaluate the alternatives. In the Forest Plan Amendment process, the following four issues formed the basis for the new Planning Problems:

1. Timber demand was an issue the Forest had identified in the 1983 EIS and ROD (See FSEIS Appendix C). The Secretary of Agriculture also directed the Forest to re-examine the demand for timber and other forest goods and services.
2. The USDA decision of July 31, 1985 stated the Secretary's decision that the Regional Forester had not adequately explained his reasons for approving the Forest Plan. The Secretary found the ROD should have addressed three concerns: 1) the rationale for the proposed timber management program; 2) efforts to cut costs and raise revenues in the timber management program; and 3) the circumstances under which timber sale levels would be increased during the planning period. The Deputy Chief of the Forest Service clarified the Secretary's decision in a letter dated June 23, 1988. (See FSEIS Appendix C)
3. Timber sales for which costs exceed revenues has become an issue to address. While the Secretary's decision discussed below-cost timber

sales, they are also an issue of servicewide interest and would have been addressed in the timber demand analysis regardless of the Secretary's decision.

4. Aspen management emerged as a Forest concern. In the Plan the concern for aspen was minimal due to low aspen-timber demand. The concern over aspen management surfaced when a new waferboard plant moved into the area which requires large volumes of aspen to operate.

The GMUG Forest Planning Process

The planning and environmental analysis process brings both a new outlook and a new technology to National Forest land management, principally:

- (1) processes formerly used to make individual resource decisions are now combined to help make integrated resource management decisions, and
- (2) mathematical modeling techniques are used to assist in the proposed land use problem, including identifying the most cost efficient pattern of land management.

The 10-step planning process is discussed in the NFMA regulations (36 CFR 219.12). The steps in the process are:

- Step 1 Identify public issues, concerns, and opportunities
- Step 2 Develop planning criteria (Problems)
- Step 3 Collect data and information
- Step 4 Analyze the management situation
- Step 5 Formulate alternatives
- Step 6 Estimate the effects of the alternatives
- Step 7 Evaluate the alternatives
- Step 8 Select the Preferred Alternative and publish the Draft Environmental Impact Statement (DSEIS)
- Step 9 Approve the plan and publish the Final Environmental Impact Statement (FSEIS)
- Step 10 Implement the approved Forest Plan

Each analysis process step (3, 4, 5 & 6) is briefly described below. Steps 2 and 3 are discussed in the body of the EIS and are extensively documented in the Planning records.

Step 3 - Inventory Data and Information Collection (Planning Action 3)

Following the issue and criteria development process, the ID Team began assessing the data needs of the various planning actions. The analysis of the management situation, and formulation of alternatives require data on resource capabilities, forest conditions, forest trends, existing timber supply and demand, expected outputs, forest benefits, and costs. During planning action 3, management strategies, standards and guidelines, resource yield tables, and production coefficients were developed. All the data developed are on file in the Forest Supervisor's office. Section II will discuss the inventory data and information collection process in greater detail.

Step 4 - Analysis of the Management Situation (planning action 4)

The analysis step examines resource supply, market conditions and the abilities of the Forest to resolve the competing issues. A land use allocation and activity scheduling model (FORPLAN) was used to address a number of specific requirements, including the benchmark analysis. The benchmark analysis determines the maximum economic and resource production levels of the Forest in order to define the Forest "decision space" for formulating alternatives. The decision space for the Forest defines the minimum and maximum production levels of the resources. The ID Team uses the decision space to develop the alternatives through various combinations of the resource production levels and land allocations.

Other objectives of the analysis of the management situation include:

- testing planning criteria;
- evaluating the feasibility of reaching the National production goals (RPA targets) and social demands identified as issues and concerns;
- identifying monetary benchmarks which estimate the output mix which will maximize present net value (or minimize the cost) of resources having an established market or assigned value;
- testing to determine the effects and tradeoffs of Minimum Management Requirements (MMR's), new inventories, laws, regulations, and policies;
- determining if there is a need to establish or change management direction.

The entire process is discussed in detail in Section VI of this Appendix.

Step 5 - Formulation of Alternatives (planning action 5)

The information gathered during the first four planning actions was combined and analyzed to formulate alternative management plans. The alternatives reflect a range of resource management directions. Each major public issue and management concern was addressed in one or more alternatives. Alternative emphases for different groups of issues were also examined. Analysis area prescriptions and practices were combined to represent the most cost efficient method of attaining the objectives for each alternative. Both priced and nonpriced outputs were considered in formulating the alternatives. The alternative formulation process is discussed in FSEIS Section VII Appendix B.

Step 6 - Evaluation of Alternatives (planning action 6)

The physical, biological, economic, and social effects of each alternative were estimated and analyzed to determine how each alternative responds to the range of goals and objectives that were defined to address the issues, concerns & opportunities. FORPLAN was used to estimate some of the economic and physical output effects; other methods were used for the remaining effects. The analysis determined: (a) direct effects; (b) indirect effects; (c) conflict with other Federal, state, and local plans; (d) other environmental effects;

(e) cumulative effects; (f) socioeconomic effects within the Forest influence zone; (g) tradeoffs associated with various resource production levels and land allocations; and (h) mitigating measures for resource protection. The effects of the alternatives are discussed in Chapters II and IV of the FSEIS and in Section VIII of appendix B.

Process Documents and Planning Records

Throughout this appendix, many references are made to other planning documents for a more detailed explanation of various steps in the planning process. These are process papers used internally on the Forest to document the analysis process. All analysis documents are on file for public access in the Forest Supervisor's office.

The Forest's planning records are incorporated by reference and are also available for review.

II. - INVENTORY DATA AND INFORMATION COLLECTION

Forest Data Base

Existing data from the original 1983 Forest Plan analysis is used in the Forest Plan Amendment process, where those data are appropriate. Additional data was collected to help answer new issues identified for the Plan amendment, and to update and improve existing information.

A land management planning data base was developed for the Original 1983 Forest Plan. Planning Action 2, Appendix F explains the components used during original Plan development.

Since the Plan was issued, the "Resource Information System" (R2-RIS) has become the standard data base for the Rocky Mountain Region. Forest Service Handbook-FSH 6609.21 displays information and coding structure for the Forest's data base. R2-RIS provides specific resource information for each of the 50,000 land units (sites) on the Forest.

R2-RIS is used for the analysis area (AA) identification process, for initially determining land not appropriate for timber production, for effects analysis, and for monitoring.

By 1987, the GMUG National Forest completed an inventory of timber resources. However, errors existed in the RIS data base and the quality of the RIS differed on the seven different Ranger Districts. Since analysis areas were developed from the RIS data base, the analysis is using five-year-old information. The analysis areas do not take into account recent harvesting activities, and therefore FORPLAN is not able to defer sites that should not be entered for several decades. The condition is limited primarily to the Gunnison Zone conifer sites that were clearcut. It is estimated that 15,000 acres of conifer sites should be deferred from entry in the first 5 decades. The resolution of these problems is discussed later in this chapter under the section, "Lands not Appropriate."

Table B-II-1 displays a summary of acreages by forest type and availability based on the new inventory.

Table B-II-1

SUMMARY OF ACREAGES BY FOREST TYPE AND AVAILABILITY

Forest Type	Available	Reserved	Total
<u>Timberland</u>			
Blue Spruce	1,749	-	1,749
Limber Pine	644	97	741
Douglas-fir	74,359	3,871	78,230
Ponderosa Pine	114,179	521	114,700
Spruce-fir	577,799	200,951	778,750
Lodgepole Pine	256,445	60,674	317,119
Aspen	475,464	53,924	529,388
Bristlecone Pine	2,924	-	2,924
Total Timberland	1,503,563	320,038	1,823,601

Table B-II-1 (continued)

SUMMARY OF ACREAGES BY FOREST TYPE AND AVAILABILITY

Forest Type	Available	Reserved	Total
<u>Woodland</u>			
Cottonwood	1,138	-	1,138
Gambel Oak	162,490	5,116	167,606
Pinyon/Juniper	110,814	1,283	112,097
Total Woodland	274,442	6,399	280,841

Total Acres 1,778,005 326,437 2,104,442

Table B-II-2, displays available timberland by stand size.

Table B-II-2

SUMMARY OF ACREAGE BY FOREST TYPE AND STAND SIZE AVAILABLE TIMBERLAND

FOREST TYPE	SAWTIMBER	POLES	SEEDLING/ SAPLING	NONSTOCK	TOTAL
Blue Spruce	1,497	252	-	-	1,749
Limber Pine	148	496	-	-	644
Douglas-fir	62,679	11,383	297	-	74,359
Ponderosa Pine	95,975	3,366	7,221	7,617	114,179
Spruce-fir	468,339	96,873	11,256	1,331	577,799
Lodgepole Pine	97,086	141,290	17,285	784	256,455
Aspen	233,649	227,404	14,276	135	475,464
Bristlecone Pine	1,805	1,103	16	-	2,924
Total Acreage	961,178	482,167	50,351	9,867	1,503,563

Available Timberland 1,503,563

Reserved Timberland (Withdrawn From Timber Production) 320,038

Available Woodland 274,442

Reserved Woodland 6,399

Non-Forest Land 838,229

Census Water 10,515

Total National Forest Acres 2,953,186

GMUG Forest Inventory 1987

Analysis Areas

The Draft Supplemental Environmental Impact Statement (DSEIS) analysis areas were developed to identify the major differences in costs and benefits among timber, big game, livestock grazing (range) and water production. Between

Draft and Final Supplemental Environmental Impact Statement (FSEIS) the range and wildlife analysis area identifiers were dropped and new identifiers were added to better reflect the appropriateness of the Forest's tentatively suited timber land. All DSEIS analysis areas not tentatively suited for timber production were also dropped from the FSEIS analysis.

A mapping effort was conducted between DSEIS and FSEIS of tentatively suited timber lands to identify those acres most appropriate for timber production. The mapping effort identified the Forest's best timber lands as appropriate timber lands and identified other tentatively suited timber lands as not as appropriate for timber production and identified the reason why.

Production Coefficients

The ID Team developed coefficients (yields) for road construction, road reconstruction, road maintenance, timber production, and water augmentation. The coefficients were used in the planning model to determine the tradeoffs between resource outputs (timber production vs. water augmentation). A more detailed discussion of the resource coefficients is found in Section III.

Cost estimates were based on recent experiences and analysis of a ten-year timber sale action plan. Variable timber costs were dependent upon the level of timber production. Other costs not related to variable timber management levels were assumed to be fixed for all benchmarks and alternatives. Only those costs related to timber management were accounted for within the analysis. The FSEIS, Appendix B, Section IV explains the development of costs and benefits used in the model.

Lands Tentatively Suited For Timber Production

According to the NFMA Regulations timber production and commercial harvesting generally may take place only on lands classified as suited lands (36 CFR 219.14). The process for determining lands suited for timber production is one of eliminating lands from the forested base; i.e. one starts with all forested lands in public ownership, then begins eliminating lands for various reasons. The process is described in the Forest Service Timber Resource Planning Handbook FSH 2409.13, Chapter 20. The elimination of lands occurs in two different steps; these steps are:

- 1) those lands not considered tentatively suited, and
- 2) those lands considered not appropriate for timber production. The number of acres considered not appropriate can vary according to the alternative being considered.

Lands are not considered tentatively suited if:

- The land is not forest land as defined in NFMA.
- Technology is not available to ensure timber production from the land without irreversible resource damage to soil productivity or watershed condition.

- Reasonable assurance that such lands can be adequately restocked as provided in NFMA is not present.
- The land has been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

The Forest identified lands in all four of the above categories. Information was gathered from the Forest's R2-RIS data base. The Ranger Districts identified timber lands as tentatively suited for timber production using the R2-RIS Handbook (See Forest Service Handbook-FSH 6609.21). During the process of mapping appropriate timber lands between Draft and Final SEIS the tentatively suited land base was found to include acres not tentatively suited for timber production. The tentatively suited timber base was then adjusted to remove those acres not considered tentatively suited for timber production. Refer to the following section on "Lands not Appropriate."

Table B-II-3 displays the determination of tentatively suited timber lands on the Forest based on the timber inventory and the mapping of appropriate timber lands.

Lands Not Appropriate

Timber lands not appropriate for timber production are determined indirectly through the determination of suited timber lands by alternative. For each alternative considered in detail, there are lands identified as suited for timber production in order to meet the objectives of each alternative. These lands are taken from those lands identified as "tentatively" suited during the first stage of the analysis. In the final alternative, the "tentatively" suited acres which are not identified as "suited" in the final stage of the analysis are considered "not appropriate" for timber production.

The FSEIS suited timber land analysis includes a step which uniquely identifies lands not appropriate for timber production according to each alternative's goals and objectives prior to the FORPLAN analysis. Some alternatives were allowed to select suited timber lands from all tentatively suited timber lands while other alternatives such as Alternative 1G were allowed to select only from appropriate timber lands.

Table B-II-3

Timber Land Suitability
Grand Mesa, Uncompahgre & Gunnison National Forest

	Not Suited For Timber Production	<u>Totals</u>
I. Total National Forest Area		<u>3,163,403</u>
A. Other Ownerships	<u>210,217</u>	
II. Net National Forest Area		<u>2,953,186</u>
A. Water	<u>10,515</u>	
B. Non-forest (not stocked with 10% tree cover)	<u>838,229</u>	
C. Lands Developed for Other Than Timber Production Purposes (administrative sites, campgrounds, cultural areas)	<u>10,349</u>	
III. Forested Lands		<u>2,094,093</u>
A. Withdrawn from Scheduled Timber Production [219.14(a)(4)]		
1. Wilderness	<u>269,116</u>	
2. Research Natural Areas	<u>237</u>	
3. Wilderness Study Areas	<u>33,535</u>	
4. Further Planning Areas	<u>6,801</u>	
Subtotal	<u>309,689</u>	
B. Forest Land Incapable of Producing Industrial Wood	<u>417,613</u>	
C. Irreversible Resource Damage [219.14(a)(2)]	<u>102,582</u>	
D. Regeneration Difficulty [219.14(a)(3)]	<u>8,917</u>	
E. Inadequate Response Information	<u>1,751</u>	
IV. Tentatively suited Forest Land		<u>1,253,541</u>
V. Total of Nonsuited and suited Lands This Forest Plan Amendment	<u>2,403,055</u>	<u>550,131</u>
VI. Land Status Under 1983 Forest Plan	<u>2,476,935</u>	<u>476,251</u>

According to 36 CFR 219.14(c), lands considered not appropriate for timber production fall into one of three classifications: 1) lands where minimum management requirements could not be met if timber activities occurred on them, 2) lands where, based on multiple-use objectives, the land is proposed for

resource uses that preclude timber production, and 3) lands not cost-efficient over the planning horizon, in meeting forest objectives, which include timber production.

The tentatively suited lands were mapped on overlays using 7.5' topographic base quadrangle maps (170 separate topographic quadrangles). Then, Ranger District personnel, having on-the-ground knowledge, identified lands not-appropriate for timber production for the reasons (appropriateness category) displayed below. The planning team then counted the acres of lands both appropriate and not appropriate by analysis area, by Ranger District. The acres were further delineated by either conifer or aspen types as well as the corresponding category that caused an area to be considered not appropriate.

The planning records contain the appropriateness category maps and overlays. Many areas were considered not appropriate for more than one reason. The predominant reason is indicated on the overlays. See Forest Planning Records R-1920-2-2(e)

ROCK (mapped as "1" category acres)

The areas identified as not appropriate because of "Rock" are lands where surface rock was present in sufficient size and quantity (over 50% ground coverage) to make logging impractical due to timber breakage during felling and severe limitations on skidding abilities.

LOW PRODUCTIVITY (mapped as "2" category acres)

The areas identified as not appropriate because of "Low Productivity" are lands where the forested stands were either isolated and/or marginal because of small size (dry, low productivity sites).

STEEP SLOPE/ACCESS (mapped as "3" category acres)

The areas identified as not appropriate because of "Steep Slope/Access" had slopes over 40% and sites where the timber stands were not reasonably accessible due to either high road construction costs through steep adjacent terrain or because of excessive road construction mileage.

IRREVERSIBLE DAMAGE (not tentatively suited - mapped as "5A" category acres)

These are lands where "Irreversible Damage" would likely occur if timber management and associated road building activities were to occur (See FSEIS Table III-6). In the DSEIS (Table III-6), only 41,223 acres were identified as not being tentatively suited because of risk of damage. The "Irreversible Damage" lands are primarily on highly unstable soils, and approximately 61,000 acres of "Irreversible Damage" lands missed in the DSEIS analysis should not have been considered as tentatively suited. The RIS data base, which the DSEIS used as the only source of information, clearly did not reflect the true acreage of lands where "Irreversible Damage" could occur.

VISUALLY SENSITIVE (mapped as "5B" category acres)

These are lands where other uses had a higher value than timber and timber management activities (on a sustained yield basis) were not compatible. The

"Multiple Use" areas were identified, in part, in response to public input received during the public comment period. Examples of "Multiple Use" areas include the north slopes of Mount Sneffels, the Kebler Pass corridor, ski areas, and formally designated domestic watersheds.

APPROPRIATE

Those remaining tentatively suited timber lands not classified as a "1," "2," "3," "5A," or "5B" are considered "appropriate lands" in the discussions throughout the FSEIS.

The results of the mapping efforts of lands considered not appropriate for timber production are displayed in Table F-2 (Final Amendment).

The results of the map analysis were incorporated into the FORPLAN analysis of alternatives. The acres of tentatively suited lands, reduced through constraints on the model, for each alternative are displayed below:

<u>Alternative</u>	<u>Reduced by:</u>
1A	5A acres
1C	5A acres
1D	1,2,3,5A & 5B acres
1E	5A acres
1G	1,2,3,5A & 5B acres
1H	5A acres
Benchmark	5A acres

For Alternatives 1A, 1C, 1E, and 1H, the acres in the visually sensitive category were available for selection by FORPLAN. Scenic areas were acceptable to be selected as suited timber lands. This is in keeping with the objectives of those alternatives. In Alternatives 1D and 1G, acres in the visually sensitive category were not available for scheduled timber harvesting.

None of the alternatives were allowed to consider acres from the 5A category because these would cause irreversible harm. These were acres not properly accounted for in the original RIS inventory; they should have been eliminated from the tentatively suited land base.

Allocation and Scheduling Alternatives

Each analysis area is linked to specific age classes of existing vegetation, to production capabilities and costs for timber production, and to water augmentation. The allocation of management activities for the benchmarks and for alternatives 1A through 1D was made at the analysis area level and later transferred to the ground with the help of district staff. Alternative 1G decade one timber harvest scheduling was identified outside of FORPLAN by the Ranger districts; timber harvest scheduling in decades 2-15 were determined by FORPLAN. Alternatives 1E and 1H contain a combination of both timber scheduling methods for decade one. Both of these alternatives harvest timber at levels above that of Alternative 1G in decade one. The additional decade one timber in Alternatives 1E and 1H is scheduled with the use of FORPLAN as are Alternatives 1A through 1D.

As stated above, Alternative 1G timber harvest scheduling was completed for the first decade before 1G was analyzed in FORPLAN. Each District identified a proposed ten-year timber sale program from its appropriate timber acreage which could be sustained indefinitely. Each District's ten-year timber sale program consisted of individual proposed timber sales which were analyzed by the I.D. team on a sale by sale basis. The FORPLAN analysis then provided information on long term production levels, benefits, and costs, but the initial ten year schedule was based on the Forest's best estimate of what it could do over the next decade

Management area allocations also influence the alternatives. The purpose of the management area designations are to define the primary management emphasis on a specific part of the forest and to prescribe specific direction and standards for management activities. Management areas differ from each other primarily in how the standards and guidelines are applied. (described in Chapter III of the Forest Plan.)

In the original EIS each alternative was made up of different mixes of management area emphases. The existing mapping of management areas from the 1983 Forest Plan generally remained the same, except for changes needed to correct errors in the original Forest Plan. During the Forest Plan Amendment process, the ID Team discovered the acreages published in the Forest Plan on pages III-88 through III-90 of the original FEIS were in error for some of the management areas. The acres shown published in the Plan, the actual current acres, and the acres proposed in the Forest Plan Amendment are shown in FSEIS Table II-5.

The changes that occurred are:

1. Some dispersed recreation areas (2A) were mapped as roaded natural (2B) because of the four wheel drive opportunities. It became clear that the 2B should have been a corridor along the primitive roads since off-road motorized use is prohibited. Therefore, some 2B acres were revised to semi-primitive motorized (2A).
2. The woody draw prescription (4C) was intended for use on National Grasslands and was inappropriately used during the original Plan development. These acres were generally reassigned to the management area prescription of the area adjacent to them; most 4C acres became either wildlife indicator species (4B), range management (6B), or aspen management (4D) emphasis areas.
3. In the wood fiber production emphasis areas, management prescriptions 7A (clearcutting) and 7E (shelterwood), were combined into the revised 7A which does not specify which silvicultural method will be used to achieve the objectives of wood fiber production but allows for project level determination of harvest methods.
4. No lands with a slope of over 40% are considered suited for timber production and therefore the management area emphasis in 7C (timber production on steep slopes) was not appropriate for this decade. The 7C areas generally were reassigned the management area prescription of the area adjacent to them.

5. The 13,256 acres of management emphasis for water production through vegetative management (9B) were considered inappropriate for two reasons: 1) the Forest does not intend to manage lands through the commercial timber sale program for the primary purpose of augmenting water flows. However, we do intend to claim these benefits when and where they occur. Most 9B areas are aspen whose capacity for rapid revegetation limit it to half the water production capabilities of spruce/fir. The 9B areas were reassigned to 4D (aspen), 2A (semi-primitive motorized), and 7A (wood fiber production).

Monitoring

At intervals established in the Forest Plan, management practices will be evaluated to determine how well objectives have been met, the accuracy of cost and yield estimates, and how closely management standards and guidelines have been applied. The results of monitoring and evaluation may be used to analyze the management situation during review of the Forest Plan in future years (See chapter IV of the amended Forest Plan for additional information.).

Sources of Data

Timber

Timber volumes and growth were based on an inventory of timber stands on the GMUG which is documented in a paper entitled "Inventory of the Grand Mesa, Uncompahgre, & Gunnison National Forest - Book 2 - Per Acre Values by Forest Type and Stand Size." USDA Forest Service, Rocky Mountain Region, Timber Forest Pest & Cooperative Forestry Management, 1986. (See Forest Planning Records R-1920-2-1-[o])

A Forest paper entitled "Timber Yield Table Documentation" by Art Haines & Jeff Ulrich, 1987, documents the results of the timber yield analysis; a second Forest paper entitled "Silvicultural Input For The Forest Plan Remand" by Art Haines, 1987, documents the process used to develop timber yields. (See Forest Planning Records R-1920-2-1-[o])

Soil and Water

A Forest paper entitled "Water Yield" by Larry Meshew, 1988, documents the process used to develop water augmentation yield coefficients. (See Forest Planning Records R-1920-2-1-[o])

Economics

All costs were derived on the Forest using the most current (Forest Plan Data File revised 8/25/89) budget data. (See Forest Planning Records R-1920-2-1-[u])

A paper entitled "Marginal Economic Value of Runoff From The Grand Mesa, Uncompahgre, & Gunnison National Forests" by Thomas C. Brown, Rocky Mountain Forest & Range Experiment Station, Fort Collins, Colorado, and Benjamin L. Harding & Elizabeth A. Payton, WBLA, Inc., Boulder, Colorado, May 19, 1988, was used to document the development of a Forest specific

water augmentation benefit value. (See Forest Planning Records R-1920-2-1-[o])

Forplan Version 2: User's Guide Release 13. (See Forest Planning Records R-1920-2-1-[p])

Transportation

A Forest paper entitled "FORPLAN Road Coefficients" by Frank Robbins, 1990, was used to document the development of transportation-related coefficients. (See Forest Planning Records R-1920-2-1-[o])

Additional Data Sources Used During The Forest Plan Amendment process

Annual Cut & Sold Reports 1974-1990. (See Forest Planning Records R-1920-2-1-[r])

Timber sale folder data base in Forest Supervisor's office, 1974-1986. (See Forest Planning Records R-1920-2-1-[r])

US Bureau of Census population statistics for 1970 to 1985.

US Bureau of Economic Analysis - Personal Income by Major Source 1988.

Colorado Labor Force Review Data Supplement 1989 (See Forest Planning Records R-1920-2-1-[x])

LMPLAN R2-RIS data base, 1987.

STAGE II timber inventory, 1986.

Forest's Timber Appropriateness category mapping effort 1990. (See Forest Planning Records R-1920-2-1-[e])

Colorado State Forest Service Demand Study entitled "Demand for Forest Products from the Gunnison, Grand Mesa, Uncompahgre National Forest Area," 1987. (See Forest Planning Records R-1920-2-1-[r])

Colorado State Forest Service Supply Study entitled "Supply of Forest Products from State & Private Lands in the Grand Mesa, Uncompahgre, and Gunnison National Forest Area," 1988. (See Forest Planning Records R-1920-2-1-[r])

III - THE FOREST PLANNING MODEL

Overview

The purpose of Section III is to explain the role of the FORPLAN model (Johnson and others 1980) in the analysis process and to explain how the Forest FORPLAN model was developed. The use of FORPLAN as an analysis tool for National Forest system planning is required by the Washington Office of the USDA Forest Service (Washington Office Memo dated 12/3/79, Reply To: 1920 Land Management Planning, Subject: Development and Use of Forest Planning Model, To: Regional Foresters, NFS Staff Directors). This section presents the analysis done prior to, with, and in addition to the FORPLAN model including the process used to develop management prescriptions and to construct projected resource yields.

Forest Planning is a complex process. An enormous amount of information as well as interdependent decisions must be considered before an alternative management plan can be recommended as the one which provides the maximum net public benefits. Several interrelated computer models and analytical tools have been developed and used for this Forest Plan Amendment. These models were used in:

planning action 4, the Analysis of the Management Situation

planning action 5, the Formulation of Alternatives

planning action 6, the Evaluation of Alternatives.

The primary analytical model used in the above planning actions was FORPLAN. FORPLAN is an acronym for FOREST PLANning Model. FORPLAN is an optimization model composed of a matrix generator, a linear programming solution system (FMPS), and a report writer. Within the bounds of the matrix generator and the FMPS solution package, the user is allowed a great deal of latitude in formulating a particular mathematical forest planning problem. The model uses a series of particular mathematical equations to determine the best solution to a problem specified by an objective function (i.e., maximize present net value (PNV) or maximize timber production) and bounded by resource management opportunities, output objectives, priorities, or other constraints.

Two versions of FORPLAN have been developed since 1980: Version 1 and Version 2. The Version 1 model was an enhanced marriage of the RAM and MUSYC models and required intensive data input by users. Version 2 was constructed in response to users' requests for a more flexible model that could more easily handle a greater number of resource inputs and outputs for defining a forest's joint production structure.

While Version 1 was used for the 1983 Plan, FORPLAN Version 2 was used to construct both a prototype model and a Forest wide model for the Amendment. The prototype model was used to initially test the model's coefficients and structure at a more economical cost than using a Forest wide model. The Forest wide model was used for all benchmarks and alternatives.

The Forest's Version 2 FORPLAN model was specifically designed to help the Interdisciplinary Planning Team analyze the economic and production tradeoffs associated with timber production and water augmentation. The model was also

designed to help evaluate how various alternative management scenarios would address and resolve the identified planning problems.

Recreation was not included in the FORPLAN economic and production tradeoff analysis. Opportunities for timber management to increase recreation visitor days on the Forest could not be identified. The reason for this is that the capacity for roaded recreation opportunities on the Forest is approximately twice the demand, and additional road construction would create no additional recreation use. Conversely, recreation use and timber harvest records over time do not suggest that recreation use is being reduced by timber sales. The Forest has been harvesting timber for over forty years, yet the recreation industry has been growing and continues to grow. All benchmarks and alternatives were assumed to have no effect on the amount of recreation use on the Forest.

Wildlife, other than big game, was not included in FORPLAN because minimum viable populations are being met and the demand for additional numbers does not exist. In addition, the wildlife model which estimates habitat capability (HABCAB) for the Forest's indicator species does not work well on a forest wide basis. The model is best suited for smaller areas of 5,000 to 20,000 acres in size, not the 1,300,000 acre area analyzed in FORPLAN.

Big game and domestic livestock production were removed from the FORPLAN model between the DSEIS and FSEIS versions. Big game and domestic livestock production occurs predominately on the Forest's grass and brush lands, not on the Forest's timber lands. All alternatives in the DSEIS included the same amount of big game and domestic livestock production; both were produced at the estimated level of demand in all alternatives.

One key step in the development of the FORPLAN model was to divide the total Forest into "analysis areas." The Forest's analysis areas consist of noncontiguous tracts of land with relatively homogeneous characteristics in terms of the outputs and effects analyzed in FORPLAN. The analysis area stratification was intended to capture the significant biological and economic differences in the way the Forest responds to alternative management strategies.

Management emphasis was not modeled in FORPLAN but was considered fixed in all alternatives. Timber management is basically the same on suited timber land in any of the management emphases. At the Forest level of analysis, an acre of three step shelterwood or clearcut harvesting provides the same timber yield and has the same costs in a wildlife emphasis as a timber emphasis. Differences which may exist from one site to another are addressed at the project level.

Management intensity (clearcutting, shelterwood harvesting, etc.,) was limited to a choice of either 1) timber management or 2) no timber management. Up to twelve different management activities were available to each analysis area.

Management prescriptions in the Forest's FORPLAN model are a combination of management intensity (specific management practices) and a timing choice (first decade through the fifteenth decade). A unit of time in FORPLAN is a decade, and all costs and benefits are assumed to occur in the middle of each decade. FORPLAN management prescriptions are used to schedule management practices and to define the associated outputs and effects over the 150 year analysis

period. The outputs and effects associated with the prescription choices are represented as mathematical coefficients within the FORPLAN matrix. All analysis areas were considered for minimum level management as well as a number of timber management activities.

The prescriptions FORPLAN selects for each analysis area depend upon the objective function, the set of alternative or benchmark constraints used, and the efficiency of the prescription. The objective function is a mathematical equation which reflects the overall goal (maximize present net value or maximize timber production) of a given benchmark or alternative. Constraints are mathematical equations controlling the amount of a given output or activity. Constraints can be viewed as exceptions to the objective function (Example: maximize PNV as long as 10,000 MCF are harvested annually, where PNV is the objective function and 10,000 MCF is the constraint). Each benchmark or alternative has many constraints. All constraints must be satisfied before an optimal solution to the objective function is reached. FORPLAN identifies all possible solutions which satisfy all constraints and then searches among the solutions for the one which best meets the objective function.

Analysis Process and Analytical Tools

Analysis Prior to FORPLAN

Once the issues, concerns, and opportunities were identified and a planning category was developed, the ID Team began to conduct analyses to aid in building the FORPLAN model. Analyses were conducted on benefit values, costs, timber prices, demand, and production coefficients.

Benefit values were taken from the 1985 RPA except for Timber and Water values. Timber values were calculated from 1988 to 1990 cut and sold reports (See Forest Planning records R-1920-2-1-u; Timber Benefit Value Calculations For The FSEIS Analysis 5/16/90). The water value was obtained from a special study conducted for the Forest and is discussed on page B-40.

Sample timber prescriptions were analyzed to determine if costs exceeded revenues, and if so, to identify the major reasons why. In this way timber related costs and benefits were scrutinized in detail to discover opportunities to reduce costs and enhance benefits.

Timber demand was analyzed in great detail (See Forest Planning Records R-1920-2-1-r; Demand Documents). A step-wise regression analysis was conducted to determine if any of the various stumpage, logging, and hauling costs could singly, or in combination, be related mathematically to annual harvest volume. The stepwise regression technique starts with a simple average and tests to see if adding additional independent variables enhances the ability to predict future demand. Using the information available to the Forest, the demand analysis determined that a simple average was the best predictor of current timber demand. A simple harvest trend analysis was conducted to determine the volume local mills were actually processing (this analysis was the same as the simple harvest average used in the step-wise regression analysis). Finally, the Forest contracted with the Colorado State Forest Service to conduct a survey of timber mills and operators which used Forest wood fiber to estimate annual timber demand.

The simple harvest trend analysis was selected over the State study as a better estimator of current sawtimber demand and nonwaferwood POL demand, because the simple harvest trend analysis was based on transactions evidence data (data based on actual financial transactions, such as timber sales) while the State study was not. POL waferwood demand was determined from both the State study and the limited aspen POL harvest history. The State study estimate was used as the upper level of demand, and the recent year high aspen POL harvest level was used as the lower end. For analysis purposes, the upper end was used for demand dependent calculations. In other words, aspen POL demand is at least as high as the largest annual harvest level and may be as high as the Colorado State demand study estimates.

Upward adjustments were made in current demand for conifer sawtimber and waferwood POL to estimate future demand. Current demand for aspen sawtimber and miscellaneous POL were assumed to be unchanged in the future.

Two methods were used to estimate future conifer sawtimber demand. The first method used mill estimates of future production plans from the Colorado State Forest Service Study to estimate a percent increase over existing production levels. The percent increase scheduled to take place in 1993 was simply applied to the current demand for sawtimber. The second method involved working with industry to identify specific production increases each mill planned for the near future using milling capacity already in place or under construction.

Future demand for waferwood POL was determined by using the percentage increase estimated by the waferwood plant by the Colorado State Forest Service study. The percent increase scheduled to take place in 1993 was then applied to the current demand to calculate future demand. (See Appendix B Section VI)

Production coefficients were developed using several methods. Water augmentation was determined by consulting research papers for water increases in timber harvests. Timber production coefficients were determined using two different timber growth models R2GROW and RMYLD2. R2GROW was used to analyze the yield of existing stands, and RMYLD2 was used to analyze the yield of regenerated stands. Road construction/reconstruction coefficients were average amounts in the ten-year proposed timber sale action plan.

Benchmark #1 minimum Level Management was analyzed outside of FORPLAN in a spreadsheet.

How FORPLAN Was Used In The Analysis

As directed in the Planning Regulations (36 CFR 219.12): "each alternative shall represent to the extent practical the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative."

Each analysis area had timber and no timber management options available. For example, spruce-fir could be harvested using shelterwood or selection harvest methods, or it could receive no timber management. In addition, spruce-fir shelterwood harvesting could occur with or without precommercial thinning or 100% site preparation for natural regeneration.

FORPLAN was used to analyze the production and economic tradeoffs between the timber and water resources on the Forest. The model was used to determine the most economically efficient methods for producing various mixes of both outputs. Multiple use objectives were defined by an objective function and a set of constraints. The objective functions used were:

1. Maximize timber production for the first decade.
2. Maximize timber production for fifteen decades.
3. Maximize timber financial returns for one decade.
4. Maximize timber financial returns for fifteen decades.
5. Maximize water augmentation.
6. Maximize PNW of timber and water production for fifteen decades.

Each objective function was optimized after satisfying all the specified constraints. Constraints were designed to represent the land allocation and scheduling schemes necessary to achieve the objectives of a benchmark or alternative. The constraints attempted to provide allocations and activity schedules which were spatially and temporally feasible. Following is a list of the types of constraints used:

1. constraints on timber harvest flows, ending inventories, harvest volume, and harvest dispersion;
2. land allocation constraints for analysis areas;
3. old growth constraints;

Timber Financial Suitability

FORPLAN was used to identify financially efficient timber lands at current prices. The analysis was conducted by examining the MATRX-RX file of the Max PNW benchmark run (BM 3A). The MATRX-RX file is a file created as part of a FORPLAN run and contains objective function values for each analysis area/management activity/timing choice option (Rx) in the model. Objective function #5 in Benchmark 3A evaluates the financial efficiency of each Rx. An editor on the Fort Collins Univac computer was used to search for positive objective function #5 values. None were found; this means that no timber on the Forest is financially efficient at current average prices. Alternative 1F later confirmed this conclusion by having a zero harvest level as a result of using a maximize-financial-efficiency objective function.

Timber prices fluctuate over time. Each alternative and Forest land "appropriateness" category (Rock, Low Productivity, etc., see page B-11) was examined for the price at which it would be financially efficient. Financially efficient prices (break-even price) were determined by simply adding FORPLAN determined timber budget costs plus fixed costs and dividing by the annual harvest volume. The financial efficiency of each category of lands were determined similarly, but did not include fixed costs. The results of the analysis are presented below.

Table B-III-1

Break-Even Timber Prices by Alternative

	Sawtimber NIC 1982 \$/MBF	Conifer POL NIC 1982 \$/MBF	Aspen POL NIC 1982 \$/MBF	Total 1982 \$/MBF
Alternative 1A	\$54.01	\$0.00	\$36.91	\$52.20
Alternative 1C	\$54.16	\$0.00	\$0.00	\$54.20
Alternative 1D	\$54.29	\$0.00	\$45.16	\$53.00
Alternative 1E	\$50.58	\$43.93	\$42.23	\$46.60
Alternative 1G	\$48.94	\$45.47	\$37.12	\$44.20
Alternative 1H	\$48.30	\$44.83	\$39.23	\$43.80

Table B-III-2

Break-Even Timber Prices by Appropriateness Category

	Sawtimber NIC 1982 \$/MBF	Conifer POL NIC 1982 \$/MBF	Aspen POL NIC 1982 \$/MBF	Total 1982 \$/MBF
Appropriate	\$46.25	\$41.32	\$32.34	\$41.32
Surface Rock	\$59.20	\$70.75	\$41.39	\$57.63
Isolated Patch	\$56.38	\$62.12	\$51.95	\$56.52
Low Productivity	\$78.07	\$0.00	\$53.25	\$68.05
High Road Costs	\$58.60	\$60.41	\$49.33	\$57.13
Multiple Use	\$50.50	\$43.93	\$34.96	\$44.72

* NIC - Non-Interchangeable Component, a portion of the allowable sale quantity (ASQ) which cannot be substituted for another component. For example, if the Forest harvests all of the "Sawtimber NIC" before the end of decade one, it cannot transfer volume from the "Aspen POL NIC" and continue harvesting sawtimber.

The total alternative timber break-even price is used in FSEIS Chapter II as a general financial efficiency comparison of the alternatives. The total appropriateness category timber break-even price is used in FSEIS Chapter III as a general financial efficiency comparison of the different appropriateness land types.

The Forest analyzed increasing the price of aspen POL to achieve " break even levels. Chapter II displays the effects of incrementally increasing aspen POL prices on net timber revenue for each alternative. Chapter IV of the FSEIS further discusses the effects of increasing aspen POL prices.

Timber Economic Suitability

FORPLAN was used to identify economically efficient timber lands at current prices using a methodology similar to the financially efficient determination above. The timber economic efficiency analysis, in contrast, looked at

objective function #1 values which evaluate PNV or economic efficiency. The results are presented below in Table B-III-3.

Table B-III-3

Economically Efficient Timber Lands
At Current Average Prices⁺

FEIS AA	APPROPRIATENESS	ACCESS	SLOPE	VEGETATION	CONDITION	PRESENT NET VALUE	ACRES
13	APPROPRIATE LANDS	<1*	LOW	ES-AF-DF	NONSTOCKED	\$1.30	504
15	APPROPRIATE LANDS	<1	LOW	ES-AF-DF	POSTS & POLES	\$37.00	13,757
17	APPROPRIATE LANDS	>1	LOW	ES-AF-DF	POSTS & POLES	\$2.50	4,721
19	APPROPRIATE LANDS	<1	LOW	ES-AF-DF	SAWTIMBER	\$56.00	114,511
21	APPROPRIATE LANDS	1-2	LOW	ES-AF-DF	SAWTIMBER	\$56.00	54,840
22	APPROPRIATE LANDS	2-4	LOW	ES-AF-DF	SAWTIMBER	\$7.90	16,889
24	APPROPRIATE LANDS	<1	LOW	ES-AF-DF	SEED SAP	\$2.10	5,237
26	APPROPRIATE LANDS	>1	LOW	ES-AF-DF	SEED SAP	\$0.73	622
34	APPROPRIATE LANDS	<1	LOW	LODGEPOLE	POSTS & POLES	\$0.01	13,459
80	HIGH ROAD COST	<1	LOW	ES-AF-DF	NONSTOCKED	\$0.11	269
81	HIGH ROAD COST	<1	LOW	ES-AF-DF	POSTS & POLES	\$1.20	23,383
84	HIGH ROAD COST	<1	LOW	ES-AF-DF	SAWTIMBER	\$1.20	59,809
86	HIGH ROAD COST	1-2	LOW	ES-AF-DF	SAWTIMBER	\$1.20	62,774
89	HIGH ROAD COST	<1	LOW	ES-AF-DF	SEED SAP	\$0.34	323
122	ISOLATED PATCH	<1	LOW	ES-AF-DF	POSTS & POLES	\$2.80	5,238
125	ISOLATED PATCH	<1	LOW	ES-AF-DF	SAWTIMBER	\$7.40	16,755
127	ISOLATED PATCH	1-2	LOW	ES-AF-DF	SAWTIMBER	\$7.40	13,662
130	ISOLATED PATCH	<1	LOW	ES-AF-DF	SEED SAP	\$0.53	64
169	LOW PRODUCTIVITY	<1	LOW	ES-AF-DF	POSTS & POLES	\$23.00	163
171	LOW PRODUCTIVITY	<1	LOW	ES-AF-DF	SAWTIMBER	\$32.00	1,799
172	LOW PRODUCTIVITY	1-2	LOW	ES-AF-DF	SAWTIMBER	\$32.00	6,697
201	MULTIPLE USE	<1	LOW	ES-AF-DF	NONSTOCKED	\$0.52	40
202	MULTIPLE USE	<1	LOW	ES-AF-DF	POSTS & POLES	\$17.00	2,835
205	MULTIPLE USE	<1	LOW	ES-AF-DF	SAWTIMBER	\$26.00	10,202
207	MULTIPLE USE	1-2	LOW	ES-AF-DF	SAWTIMBER	\$26.00	22,981
210	MULTIPLE USE	<1	LOW	ES-AF-DF	SEED SAP	\$0.94	924
239	SURFACE ROCK	<1	LOW	ES-AF-DF	POSTS & POLES	\$13.00	101
241	SURFACE ROCK	<1	LOW	ES-AF-DF	SAWTIMBER	\$22.00	1,706
243	SURFACE ROCK	1-2	LOW	ES-AF-DF	SAWTIMBER	\$22.00	11,165
246	SURFACE ROCK	<1	LOW	ES-AF-DF	SEED SAP	\$0.94	18

- *
 <1 - Less than one mile from a road
 >1 - Greater than one mile from a road
 1-2 - One to two miles from a road
 2-4 - Two to four miles from a road

+ See Table B-IV-4 for average timber prices.

The present net values in Table B-III-3 are determined by FORPLAN and do not include fixed timber costs (See Table B-IV-1). FORPLAN identified 30 economically efficient analysis areas consisting of 465,448 acres.

Assuming an Alternative 1G timber harvest level, adding fixed costs would increase FORPLAN timber costs by \$17.72/MCF. With fixed costs included, economically efficient timber lands are reduced from 30 analysis areas to 10 analysis areas and 237,821 acres. Assuming lands which are not appropriate (Category 1,2,3 & 5B lands - See Page B-10) have additional costs not modeled in FORPLAN, economically efficient timber lands are further reduced to 3 analysis areas and 183,108 acres.

Benchmarks

FORPLAN was used to develop benchmarks for the Analysis of the Management Situation (AMS) planning action 4 (See Appendix B Section VI). The Benchmarks analyzed in the FSEIS are listed below:

- 3A Maximize present net value
- 4A Maximize timber
- 9 Maximize water augmentation
- 10 Current Direction benchmark (same as alternative 1A)

Timber Demand Sensitivity Analysis

FORPLAN was used to analyze the effects of different possible future timber demand scenarios. Using the key factors related to harvest levels, species substitution, and existing capacity, the Forest developed six possible scenarios; A, B, C, D, and E (See Tables B-VI-5 through B-VI-10). The demand sensitivity scenarios represent a reasonable range of alternatives and cover the major differences in demand estimates for each individual product.

After public review of the demand scenarios, one additional demand scenario (D-2) was developed with the aid of key interest groups. (See Tables B-VI-9 and Forest Planning Files R-1920-2-1(R)). Demand Scenario D-2 was developed to provide a better projection of future timber demand. D-2 is the future timber demand estimate used in all alternatives.

Alternative Analysis

Once the benchmark analyses were completed, the Interdisciplinary Team proceeded to develop a range of alternatives to address the issues, concerns, and opportunities (refer to the FSEIS, Appendix B, Section VII). Each issue, concern, and opportunity was addressed in the alternatives either through land allocations, harvest scheduling, standards and guidelines, or policy statements. Information from the benchmark and appropriate timber land mapping analyses were used to determine the "decision space" available to the ID Team for constructing alternatives. Alternatives were developed by using a maximum present net value objective function and a set of constraints necessary to achieve the intent of each alternative.

The FORPLAN model was used to evaluate six management alternatives for the final FSEIS. The constraints used to define the alternatives were analyzed separately with a tradeoff analysis (for more detail see Section VIII).

Analysis In Addition To FORPLAN

Due to the powerful features of Version 2 FORPLAN, a majority of the direct outputs and effects associated with each alternative were calculated within the model itself. However, the model was not able to incorporate all aspects of forest management into the formulation. The outputs and final indices calculated outside the FORPLAN model are listed below:

1. changes in employment
2. changes in personal income
3. changes in payments to counties
4. return to the U. S. Treasury
5. fixed costs and benefits
6. changes in existing ROS and VQO allocations
7. changes in diversity
8. changes in sedimentation and channel stability
9. changes in unroaded acres and sensitive unroaded areas

Most of the outputs listed above were derived using outputs from the FORPLAN reports in combination with or through minor adjustments to other outputs explicitly displayed in FORPLAN reports.

The outputs related to timber management were almost entirely derived using the FORPLAN model. However, fuelwood volumes were calculated outside of FORPLAN using historic fuelwood consumption levels.

Diversity was analyzed and calculated outside FORPLAN although the information used to calculate diversity was taken from FORPLAN.

Changes to the acres of semiprimitive nonmotorized recreation, visual quality, and dispersed recreation were determined with the help of the R2-RIS data base and FORPLAN outputs.

The arterial & collector miles of road construction/reconstruction were developed from the needs of the original 1983 Forest Plan through the current updated Forest Plan Program Budget and were held constant for all alternatives.

FSEIS Chapter IV includes a discussion on unroaded areas and their relationships to each of the alternatives. FSEIS Chapter 2 contains a comparison of effects on sensitive roadless areas beginning on Table II-6. Following are the methods used to derive roadless area effects.

Ten year timber sale maps from Alternatives 1A, 1E and 1G were overlaid with roadless area boundaries. The number of roadless areas entered was counted, and the gross sale area acres measured. Calculations for the other alternatives are based on estimated changes from Alternatives 1A, 1E, and/or 1G.

Alternative 1H was calculated using known differences from Alternative 1G. Alternative 1H has an increase of 630 ac/yr over Alternative 1G, a 7.3% increase. Alternative 1H roadless area acres entered is then 4,754 ($4,431 * 1.073$). Alternative 1H roadless areas entered is 20 ($19 * 1.073$ rounded to the nearest whole number).

Alternatives 1C and 1D roadless area effects were calculated with a method using known differences from Alternative 1A, which was used as a base for these areas.

The interdisciplinary team evaluated each alternative to determine the direct, indirect, and cumulative Forest wide effects unique to each alternative. The results are documented in Chapter IV of the FSEIS.

In the final step, the Interdisciplinary Team, along with the Forest Management Team and other district personnel, evaluated how well each alternative addressed the issues, concerns, and opportunities identified at the outset of the planning process.

Identification Of Analysis Areas

One of the first steps was to divide the Forest into analysis areas using the resources attributes defined in the Forest data base. Analysis areas are tracts of land assumed to be homogeneous in terms of the outputs and effects being analyzed. They serve as the basic unit of land or as the building blocks in the model for which a range of prescriptions are developed to achieve various multiple-use objectives. The delineations were intended to capture the significant biological and economic differences in the way the land responds to alternative management strategies and to keep the model size to a minimum for cost and time efficiency reasons. The analysis areas were stratified using the FORPLAN level identifiers in order to address issues, concerns, and opportunities identified at the outset of the planning process.

How Issues, Inventory, Data Reliability, and Computer Model Limitations Influenced Delineation of Analysis Areas

In the Draft Supplemental Environmental Impact Statement (DSEIS), the I.D. team developed 329 analysis areas to use as a way of focusing on the issues of the analyse: the UDSA Decision, timber demand, below-cost timber sales, and aspen management. The 329 adequately serve this purpose.

A key issue of the DSEIS analysis was to quantify and analyze the multiple use benefits of timber harvesting and to determine whether or not timber harvesting or some other method was best for the production of multiple use benefits. Three potential multiple use benefits in addition to timber were identified:

1. Big game habitat on winter range
2. Domestic livestock production
3. Water augmentation.

The DSEIS analysis indicates timber production does not have a significant effect on big game or domestic livestock production. All alternatives produced the same level (all met estimated demand levels) of big game and livestock. The most productive domestic livestock lands are the Forest's grass and brush lands, not the Forest's timber lands. Winter range is critical to big game and is a limiting factor; however, very little of the Forest's timber lands are big game winter range. Therefore, big game and livestock production were not compared futher as benefits. Only timber production and water augmentation were assigned economic value in the analysis.

Between the Draft and the Final SEIS, timber costs were more accurately modeled as a result of the suited lands mapping effort. (See page B-8). The results of the District mapping effort were included as FORPLAN level #2 analysis area identifiers in the FSEIS in place of the big game and domestic livestock production identifiers used in the DSEIS.

To analyze timber harvesting effects, analysis areas must differentiate between the ability of different land types to produce timber and water augmentation. To analyze timber production one has to know the cost of timber production (FORPLAN identifier #2), the amount of road construction required (FORPLAN identifier #3), the slope of the land (FORPLAN identifier #4), the species of tentatively suited timber (FORPLAN identifier #5), and the condition of a given timber stand (FORPLAN identifier #6). The information needed to analyze water augmentation is the same as that needed for timber production. The above information needs were used to develop the categories of FORPLAN identifiers 2-6, which define the FSEIS analysis areas.

Between the time of the DSEIS and the FSEIS, analysis areas were reduced from 329 to 256. The reduction occurred in two steps. First big game and livestock level #2 identifiers and non-tentatively suited timber lands were removed from the FSEIS analysis areas; this reduced the analysis areas to 77. Second the timber appropriateness categories were added back to the level #2 FORPLAN identifiers; this increased the analysis areas to 256. (See Forest Planning Records R-1920-2-1-[n], DSEIS to FSEIS Analysis Area Conversion Table)

Analysis Area Development

The original analysis areas used in the 1983 Forest Plan analysis were not used in the Forest Plan Amendment because they could not address the issues of the amendment. Therefore, a new set of analysis areas were developed. The characteristics of the new analysis areas are defined below.

An analysis area is an aggregation of acres with similar production capabilities from across the Forest. An example is analysis area 241 which represents all the acres on the Forest which are tentatively suited mature Englemann spruce-Alpine fir-Douglas fir on rocky soil, less than a mile from an existing logging road, on slopes less than 40%. An analysis area is defined by six levels of attributes. Each attribute can have one or more categories.

The I.D. team used a top-down approach to identify the DSEIS analysis areas on the Forest. First, all possible unique combinations (over 16,000) of identifiers were determined. The number of analysis areas was then reduced by eliminating illogical combinations, by combining similar analysis areas which did not differ significantly in yields, by combining analysis areas of less than 300 acres into similar larger analysis areas, and by eliminating combinations which were not crucial to the issues of the amendment. Every vegetation type combination on the Forest was considered. The FSEIS analysis areas were developed from the DSEIS analysis areas.

The six levels related to issues, concerns, and opportunities analyzed in the FSEIS are:

Level 1. Proclaimed Forest. There are six categories for this level. One is a Forest-wide component, another is a "dummy" used for tracking fixed costs.

Level 2. Timber Appropriateness. Level 2 identifies different types of timber land classified by production costs or productivity. There are six timber appropriateness categories.

Level 3. Road Density. There are five categories based on the distance from an existing road capable of being used to haul timber. Level 3 identifies the distance a given stand is from a road capable of being used to haul timber.

Level 4. Slope Class. There are two categories in this level: high and low slopes. Level 4 identifies where tractor logging can occur (low slopes) and where other forms of logging are needed.

Level 5. Vegetation Types. There are five timber categories of vegetation on the Forest. Level 5 identifies the vegetation types needed to determine timber production and water augmentation.

Level 6. Timber Condition. There are seven categories based on the condition of the forested areas. Level 6 identifies the condition of tentatively suited timber stands which helps determine timber volumes per acre over the planning horizon.

Table B-III-4 summarizes the analysis area identifiers used in the FSEIS Forest Plan amendment.

Table B-III-4

FORPLAN ANALYSIS AREA LEVEL IDENTIFIERS

<u>FORPLAN IDENTIFIER CODES</u>		<u>FORPLAN IDENTIFIER DEFINITION</u>
*LEVEL 1		
FW	FORWID	FOREST WIDE ANALYSIS AREAS
FH	FSTHDQ	FOREST HEADQUARTERS
*LEVEL 2 TIMBER APPROPRIATENESS CLASSIFICATION		
SR	SRROCK	SURFACE ROCK
IP	IPATCH	ISOLATED PATCH
LP	LWPROD	LOW PRODUCTIVITY
HR	HRDCST	HIGH ROAD COST
OK	APPROP	APPROPRIATE FOR TIMBER PRODUCTION (NO RED FLAGS)
MU	MULUSE	OTHER MULTIPLE USES PRECLUDE TIMBER PRODUCTION
*LEVEL 3 ROAD ACCESS		
RD	UNROAD	ESSENTIALLY UNROADED-GREATER THAN 4 MILES- ANY SITE
01	00-01	LESS THAN OR EQUAL TO ONE MILE- SAWTIMBER SITES ONLY
02	01-02	ONE TO AND INCLUDING TWO MILES- SAWTIMBER SITES ONLY
03	02-04	TWO TO AND INCLUDING FOUR MILES- SAWTIMBER SITES ONLY

04 >=01 GREATER THAN OR EQUAL ONE MILE- ALL OTHER FORESTED STAND SIZES

*LEVEL4 SLOPE CLASS
 <4 <=40% LESS THAN OR EQUAL TO 40 PERCENT SLOPES
 >4 >40% GREATER THAN 40 PERCENT SLOPES

*LEVEL5 VEG TYPES CATEGORIES OF FOREST VEGETATION
SD SPRDOG SPRUCE FIR AND DOUG FIR
LP LODGEP LODGEPOLE PINE
PP PONPIN PONDEROSA PINE
AS ASPEN PREDOMINANTLY ASPEN
CA CONASP CONIFER INVADED ASPEN

*LEVEL6 CONDITION CLASS
NS NONSTK NONSTOCKED
SS S/S SEEDLINGS AND SAPLINGS
PO POSPOL POSTS AND POLE TIMBER
MA MATSAW MATURE SAWTIMBER
PA ASPREG SELF REGENERATING ASPEN
MT MISTLE MISTLETOED STANDS
ST STAGNT STAGNATED STANDS

Identification Of Prescriptions

Overview

The process the Interdisciplinary Team followed to identify prescriptions used the existing Region 2 Uniform Forest Management Prescriptions (UFMP's) and the various activities or treatments which could occur with each UFMP.

The requirements of 36 CFR 219.27 are handled in the practices and mitigation requirements of the UFMP's. (see Forest Plan Chapter III)

An adequate range of prescriptions was insured by developing alternative management activities of no timber harvesting and timber harvesting. All vegetation types not classified as tentatively suited for timber production were not part of the FSEIS analysis.

Prescriptions Identified

The "Prescriptions Identified" section describes how the analysis areas were assigned to different management emphases and management intensity choices in the FORPLAN model. FORPLAN prescriptions are a combination of a management emphasis (timber production, no timber production), a management intensity (shelterwood harvest, clearcut, no harvest), and a timing choice for existing stand and regenerated stand management activities.

Management Emphasis

Management emphases included in the analysis are timber management and no timber management. The FSEIS analysis was used to identify suited timber lands, not to redetermine Forest-wide management area allocations which would require a full range of emphases such as recreation, wildlife, range, etc. Management

area allocations were determined by the original 1983 Forest Plan and were not changed by the FSEIS analysis except to make corrections.

Timber management is the same from one management area to another when examining timber management on a Forest-wide basis. An acre of timber harvesting provides the same timber yield from one management area to the next. Individual site differences are examined at the project level. Management Emphasis is the level 7 FORPLAN identifier.

Management Intensity

Management intensities are the individual activities used to treat vegetation in order to achieve the management emphasis objectives. Activities include clear cutting, shelterwood harvesting, selection harvesting, and no timber management. Management activity is the Level 8 FORPLAN identifier.

Intensities analyzed consisted of two types: timber harvest and no timber harvest.

No Harvest

All analysis areas were given the choice of a minimum level prescription to provide the model with the option to harvest no timber on some or all tentatively suited timber lands.

Timber Harvest

Many possible thinning options were eliminated from consideration in the analysis. Generally in the Rocky Mountains one precommercial, or one commercial, thin will drive the present net value of a rotation to the negative side. For example, a 30 year old spruce-fir stand is precommercially thinned at a cost of \$86.14/acre. At CMAI 120 years later the stand is harvested with a timber yield of 6.3 MCF/acre. The gross present value of the precommercially thinned timber 120 years from now is \$5.52/acre. After taking out the precommercial thin cost, the stand is worth a -\$80.67/acre without considering timber harvesting costs. In order for the future timber stand to have a chance of making money, the price of timber would have to increase to more than \$1500/MCF in 1982 dollars from its present value of approximately \$100/MCF. The general point to be made is that even though precommercial thinning more than doubles the final volume, the precommercial thin does not pay for itself. Therefore, only one precommercial thin in a rotation was considered in FORPLAN. Timber prescriptions with thinning competed in the FORPLAN analysis against no-thin timber prescriptions to determine the most efficient practice.

Precommercial thinning was assumed to occur at different times for different species in FORPLAN. For lodgepole pine and spruce-fir, precommercial thinning occurs at age 30, and for ponderosa pine precommercial thinning occurs at age 40. Thinning is not a sound practice in aspen. The thinning timing options were determined by a certified silviculturalist.

The timber intensities included in the FORPLAN analysis are listed below by timber species;

Table-B-III-5

Timber Prescriptions By Timber Type

SF - Spruce-Fir
 PP - Ponderosa Pine
 LP - Lodgepole Pine
 AS - Aspen

X = Occurs in vegetation type
 O = Does not occur in vegetation type

SF PP LP AS

X	O	O	O	GROUP SELECTION WITH RELEASE & WEED AGE 150-190
O	O	X	X	CLEARCUT
O	O	X	O	CLEARCUT WITH PRECOMMERCIAL THIN
O	O	O	O	CLEARCUT WITH/SITE PREP FOR NATURAL REGENERATION
O	O	O	O	CLEARCUT W/SITE PREP NATURAL REGENERATION & PRECOMMERCIAL THIN
O	O	O	O	PRECOMMERCIAL THIN, CLEARCUT WITH PRECOMMERCIAL THIN & SITE PREP FOR NATURAL REGENERATION
O	O	X	O	PRECOMMERCIAL THIN, CLEARCUT WITH PRECOMMERCIAL THIN
X	X	O	O	THREE-STEP SHELTERWOOD
X	X	O	O	THREE-STEP SHELTERWOOD WITH PRECOMMERCIAL THIN
X	O	O	O	THREE-STEP SHELTERWOOD W/SITE PREP FOR NATURAL REGEN & PRECOMMERCIAL THIN
X	O	O	O	THREE-STEP SHELTERWOOD W/SITE PREP
X	O	O	O	PRECOMMERCIAL THIN, THREE-STEP SHELTERWOOD WITH PRECOMMERCIAL THIN & SITE PREP FOR NATURAL REGENERATION
X	X	O	O	PRECOMMERCIAL THIN, THREE-STEP SHELTERWOOD WITH PRECOMMERCIAL THIN

Aspen timber intensities include clearcutting without thins or site preparation for natural regeneration. Aspen was considered for both sawtimber and POL production.

Ponderosa pine timber intensities include a three-step shelterwood cut with various precommercial thinning possibilities. Mature ponderosa pine was modeled as a two-step shelterwood harvest because most of the ponderosa pine on the Forest has already received the first harvest. Site prep for natural regeneration was not considered beneficial in Ponderosa pine and was not modeled. If an existing stand was 40 years old or less, it was considered for precommercial thinning. All regenerated ponderosa pine stands were considered for thinning at age 40.

Ponderosa pine was only considered as a sawtimber product. Ponderosa pine could have been considered for POL production, but POL production usually requires a clearcut harvest method which is inappropriate for ponderosa pine on the Forest due to regeneration problems.

Lodgepole pine was considered for clearcutting. All lodgepole clearcuts required 75% of the acres harvested to receive site prep for natural regeneration to allow sufficient natural regeneration of lodgepole pine.

Lodgepole was considered for both a sawtimber product and a POL product. Both considerations used only the clearcutting method. The DSEIS considered

lodgepole for a two-step shelterwood harvest which is rarely practiced on the Forest and is relatively inefficient. The two-step lodgepole shelterwood harvest was eliminated from the FSEIS analysis.

Lodgepole has a unique response to precommercial thinning. If a nonstocked, seed/sap, or regenerated lodgepole pine stand was not thinned at age 30, it would not reach sawtimber size for at least the next 150 years.

Spruce-fir had the largest number of timber prescriptions available. These included; three-step shelterwood harvesting and group selection. Spruce-fir was not modeled for POL production due to its high value as a sawtimber product.

Clearcuts in spruce-fir were included in the DSEIS but removed from the FSEIS due to public comment, negative visual effects, and the uncertainty of natural regeneration within five years of harvest as well as a change in Forest policy (See memo dated 12/21/90; Reply To: 2470; Subject: Silvicultural Practices Spruce-Fir Type Stand; To District Rangers and Staff Officers).

All spruce-fir harvests received at least 65% site preparation for natural regeneration to further ensure natural regeneration success. Special prescriptions considered 100% site preparation for natural regeneration to improve stocking.

Precommercial thinning was considered at age 30 in existing spruce-fir nonstocked and seed/sap stands and all regenerated stands.

Group selection with release and weed (a selective thinning which removes poor quality understory trees and tree species following a timber harvest) was considered for all spruce-fir stands. Group selection was not considered an appropriate silvicultural prescription in other timber types.

The 75% & 65% site preparation requirement in lodgepole and spruce-fir harvesting was added after the Forest's silviculturalist had completed the timber yield analysis. The Forest's timber staff, using their experience, determined the level of site preparation needed to ensure natural regeneration.

Timing

No-harvest intensities were allowed only in the first decade.

Timber harvests were scheduled to begin as early as 95% of CMAI (See Forest white paper "Timber Yield Table Documentation") and to continue through the end of the planning horizon with the exception of group selection in spruce-fir. Group selection was required to begin between age 170 and 210.

Originally FORPLAN considered all of the existing-stand/regenerated-stand harvest timing options possible within a 150 year planning horizon. To reduce the size of the FORPLAN model without constraining scheduling flexibility, the Forest FORPLAN model considered every other regenerated stand harvest timing option. All existing stand harvest timing options were used in the analysis. For example, say a stand of trees is 120 years old and 95% of CMAI for the stand is also 120 years. FORPLAN will allow for existing stand timber

harvesting at ages to 120, 130, 140, 150, & 260 years. The regenerated stand (trees which grow after the initial harvest) will have only half the number of timing options as the existing stand. Regenerated stand timber harvesting will be restricted ages 120, 140, 160, 180, & 260 years.

In FORPLAN all analysis areas were originally treated equally, regardless of size. An analysis area with only 300 acres could have as many FORPLAN prescriptions as an analysis area with 150,000 acres. FORPLAN has the capability to restrict the number of prescriptions applied to small analysis areas while allowing the full range to the larger ones. For analysis areas less than 1000 acres, only the most appropriate and efficient prescriptions were applied.

Development Of Per Acre Yield Coefficients

Production coefficients were developed for road construction and maintenance, timber production, and water augmentation.

Road Construction/Reconstruction

Road construction/reconstruction coefficients were used to estimate the miles of road needed for an acre of timber harvest. The coefficients were used to determine both road costs and the miles of road reconstruction & construction associated with alternative timber harvest levels.

All timbered analysis areas have a road distance identifier (level 3 identifier) which puts a given timber stand at:

1. less than a mile from a road capable of being used to haul timber (<1)
2. 1 to 2 miles away from a road capable of being used to haul timber (1-2)
3. 2 to 4 miles away from a road capable of being used to haul timber (2-4)
4. more than 4 miles away from a road capable of being used to haul timber (4+)

or

5. more than one mile from a road capable of being used to haul timber (>1)

The <1, 1-2, 2-4, & 4+ categories were used for mature, tentatively-suited timber lands which had reached CMAI in the first decade on slopes less than 40%. Other tentatively suited timber lands were classified into either the <1 or >1 category because immature or high slope timber was less likely to be harvested in the first two decades and was, therefore, analyzed in less detail than mature, tentatively-suited timber lands.

Road construction costs and coefficients were derived from a proposed ten-year timber sale action plan for Alternative 1G. Each timber sale was analyzed individually to determine accurate road construction and other costs estimates.

Forest average road construction/reconstruction costs and coefficients were then obtained from the average of the ten-year timber sale action plan.

Shelterwood and selection harvests were treated differently than clearcuts. The gross area of a clearcut has to be roaded on the first entry to insure that smaller-than-40-acre clearcut openings are properly dispersed. The road constructed for a clearcut sale must go through many intermixed unharvested blocks of timber to keep the clearcuts properly dispersed. Shelterwood and selection harvest units are not limited to 40 acres in size and do not require spacing between harvest units. The road constructed for a shelterwood or selection sale will not pass through intermixed blocks of unharvested timber as an entire timber sale unit can be entered at once and only the net area of the timber sale needs to be roaded.

The road construction and road reconstruction coefficients were added together to identify road maintenance needs. The analysis assumed that timber purchasers would provide road maintenance during the harvest which usually lasts five years; the Forest would assume the road maintenance costs for the following 15 years.

Road reconstruction was assumed to occur only for timber harvests less than two miles from a road. Harvests occurring further from an existing road were assumed to be in an unroaded area that would require all new road construction.

Only local roads were considered for construction or reconstruction in association with timber harvesting. Arterial and collector roads needed for timber production are assumed to be already in place (See Forest white paper entitled "Road Construction and Road Reconstruction Coefficients Associated with Timber Production", by Frank Robbins, 1990, which is available in the Forest Supervisor's office - See Forest Planning Files R-1920-2-1-0).

Timber Yield

Timber yield coefficients were developed with the use of timber inventory data from over 600 different timber stands, and two timber growth models: R2GROW and RMYLD2. R2GROW was used to model the volume of existing old growth and unmanaged stands; RMYLD2 was used to model the volume of managed stands. The timber inventory was used to identify the existing per acre yields, and the two timber growth models were used to estimate future volumes.

The timber yield analysis was completed by identifying current yields of standing inventories. Then the two timber growth models were used to estimate the yield for the timber prescriptions identified above under the heading "Management Intensity," for each of the 15 decades used in the analysis. The yield analysis was completed by a certified silviculturalist from the Forest and is documented in two Forest white papers entitled "Silvicultural Input For The Forest Plan Remand" by Art Haines, 1987; and "Timber Yield Table Documentation" by Art Haines and Jeff Ulrich, 1987. These are available in the Forest Supervisor's office (Forest Planning Files R-1920-2-1-0).

Both of the white papers described above document and summarize the determination of the age when a timber stand will reach "Culmination of Mean Annual Increment" (CMAI). CMAI is the age at which a stand's average growth

begins to decline. In the analysis, 95% of CMAI is used as the minimum harvest age for timber on the Forest.

Timber yields were further adjusted following the FSEIS Timber Appropriateness analysis (See Page B-8). Timber yield for surface rock analysis areas were estimated to be 80% of normal. Low productivity analysis areas were estimated to be 50% of normal based on Forest experience with timber sales. Low productivity ponderosa pine was further assumed to have no volume for the first five decades of the analysis. This reflects the condition of stands on the Grand Junction District of the Uncompahgre National Forest.

Water Augmentation

Water yield coefficients apply to lodgepole pine and spruce-fir clearcuts or created openings which are less than 20 acres in size, to aspen clearcuts, and to shelterwood harvests in lodgepole and spruce-fir.

Water yield coefficients deal only with the increase in water production over the background, or naturally-occurring, level. Background water production was placed in the fixed benefit portion of the analysis and did not change by alternative or benchmark. The background levels were the same as the levels used in the original 1983 Forest Plan.

A more detailed analysis is included in a Forest white paper entitled "Water Yield Documentation" by Larry Meshew, 1988, which is available in the Forest Supervisor's office (See Forest Planning Files R-1920-2-1-0).

IV.- ECONOMIC EFFICIENCY ANALYSIS

Section IV explains economic concepts and defines the costs and benefits involved in economic efficiency analysis, as well as explaining how the values were derived, and how the values were used in the forest planning process. Economic efficiency analysis is required by the National Forest Management Act Regulations (36 CFR 219) and played an important role in the development and evaluation of forest planning benchmarks and alternatives. Specifically, the Regulations (36 CFR 219.12(f)) state that:

"The primary goal in formulating alternatives, besides complying with NEPA procedures, is to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits."

Additionally, 36 CFR 219.12(F)(8) states:

"Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative."

Efficiency Analysis Concepts

Before explaining how economic efficiency analysis was used, a few concepts and terms related to efficiency analysis are explained below.

Priced Outputs (Benefits)

Priced outputs are goods or services which can be exchanged in the market place. The quantitative values are determined by actual market transactions or by estimation methods that produce prices commensurate with those determined by market transactions. Outputs bought and sold in the market are called "market outputs." Outputs not normally exchanged via market transactions are called "nonmarket outputs." Timber, forage, and minerals are examples of priced market outputs. The values of these outputs are determined through the interaction of buyers and sellers based on the supply and demand conditions in the market at the time of the transaction. Recreation visitor days (RVDs) are an example of priced nonmarket outputs. The values of these outputs are estimated by using market transaction data in combination with various theoretical techniques. Conceptually, priced nonmarket (assigned) values are consistent and comparable to those market values which are actually derived via market transactions (Rosenthal and others 1985). Therefore, both priced nonmarket (assigned) and priced market values are appropriate for calculating present net value.

Non-priced Outputs

Non-priced outputs are outputs which have no available market transaction evidence and thus no reasonable basis for estimating a dollar value. Non-priced outputs require that subjective, non-dollar, values be attributed to the production of non-priced outputs. The values are qualitative rather than quantitative in nature and can be either positive or negative. In fact, what may be considered to be a benefit to one party may represent a cost to someone else. Examples of non-priced outputs include the maintenance or enhancement of threatened and endangered species, natural and scientific areas, historical and

anthropological sites, visual quality, and clean air. These outputs are also referred to as non-priced indicators of responses to issues, concerns, and opportunities for the alternatives (See FSEIS Chapter II).

Discounting

Financial analyses of alternative investment options usually involve cash flows over different periods of time in the future. Inherently, a time value is associated with money. Due to human propensity to consume now, a dollar today is worth more than a dollar 10 years from now (a bird in the hand is worth two in the bush). Discounting is a process for adjusting the dollar value of costs and benefits which occur at different periods in the future to dollar values for a common time period so they may be compared. The common time period is the present, and therefore the discounted cash flow is referred to as the present value.

Present Net Value (PNV)

PNV is the difference between the discounted value of all priced outputs (benefits) and the total discounted costs of managing the planning area. The maximization of PNV is the criterion used to help ensure that each alternative is the most economically efficient combination of the outputs and activities needed to meet the alternative objectives.

Forest-priced outputs used in the analysis include timber and water augmentation. The benefits were compared against all fixed and variable timber costs associated with managing the planning area. Therefore, PNV is an estimate of the current market value of the timber program after all costs have been considered.

The PNV analysis presented in the FSEIS and Amendment is a partial PNV analysis because it related only to costs and benefits associated with the timber program. The DSEIS analysis included all costs and benefits and represented a true measure of total Forest PNV. During the DSEIS comment period, reviewers indicated that using total PNV was confusing to the reader and made understanding the economic and financial efficiency of the different alternatives difficult. Therefore, the FSEIS and Amendment use a partial PNV analysis which relates only to those values affected by the timber program.

Three different PNV terms are used in the FSEIS and Amendment analysis: Direct Timber, Increased Water Yield, and Total Timber (See FSEIS Table II-6). Direct Timber PNV is a comparison of timber revenues versus timber costs discounted over 150 years. Increased Water Yield PNV is the discounted benefit of additional water produced from timber harvesting over 150 years. Total Timber PNV is the simple addition of Direct Timber PNV and Increased Water Yield PNV.

Opportunity Costs

Opportunity costs are defined as the value of a resource's foregone net benefit from its most economically efficient alternative use (FSM 1970.5). In relation to the economic analysis performed for forest planning, it represents the decrease in PNV that an alternative undergoes when expenditures are made for non-priced benefits. Therefore, opportunity costs measure the relative trade off to produce non-priced benefits.

Net Public Benefit

The maximization of net public benefits is a goal of the forest planning process. Net public benefit is the overall value to the nation of all outputs and positive effects (benefits), minus all the associated Forest Service inputs and negative effects (costs), whether those effects can be quantitatively valued or not. Net public benefit cannot be expressed as a numeric quantity because it includes qualitatively valued non-priced outputs.

Conceptually, net public benefit is the sum of the present net value of priced outputs plus the full value of all non-priced outputs. In assessing the net public benefits of a particular alternative, non-priced indicators are evaluated to determine if their value to society exceeds the opportunity cost of their production.

Parameters and Assumptions Used for Economic Efficiency Analysis

In order to calculate the PNv for each alternative, several assumptions were made regarding discount rates, demand curves, real dollar adjustments, and real price and cost trends. The parameters and decisions are summarized below.

Discounts Rates Used

Discounting requires the use of a discount rate which represents the cost or time value of money in determining the present value of future costs and benefits. One discount rate was used to calculate the PNv for each benchmark and alternative. A real discount rate was used; this means the rate was adjusted to exclude the effects of inflation (real dollar adjustments will be discussed in more detail below).

A 4 percent real discount rate is incorporated in the analysis. The 4 percent rate approximates the "real" return on corporate, long-range investments above the rate of inflation (Row and others 1981) (See Forest Planning Files R-1920-2-1 U). The 4 percent rate was used in FORPLAN to calculate the PNv for each benchmark and alternative. All costs and benefits were discounted from the midpoint of the decade in which they were incurred.

Additionally, evaluations were made of discounted benefits and costs at the alternate real discount rate used in the most recent RPA: 7 1/8%. The Forest determined the efficiency of management using a 4% discount rate to a 7 1/8% discount rate by comparing the results of such a comparison on another Forest. The Forest estimated the cost of such an analysis to be in excess of \$2000.00 and did not want to spend funds on a 7 1/8 analysis unless it was likely to show different results. Generally, changing from a 4% to a 7 1/8% discount rate does not produce significant changes in the overall allocation; for example the Umatilla National Forest DEIS, Appendix B-37 states that the 7 1/8 analysis reduced important outputs by less than .5%.

Resource Demand Analysis

As specified by the NMFA regulations, the Forest attempted to develop a downward sloping demand curve for timber production using a statistical technique called "Stepwise Linear Regression." The Forest tested timber price, haul distance, timber sale collections (erosion control, brush disposal, and road maintenance), timber purchaser credit, and road construction contributions as predictors of timber harvest volume. None of these predictors were found to add to the predictability of a simple average-annual-timber-harvest estimate. The Forest therefore used the historic sawtimber harvest volume as the best current timber demand estimate.

Future timber harvest volume was first estimated using a timber demand study conducted by the Colorado State Forest Service that was designed to calculate the percent expansion local timber mills estimated for the future. The percentage was then multiplied by the current timber demand estimate to develop a model of future demand.

The Colorado State Forest Service future demand estimate was later replaced by a more precise estimate of future timber demand based on existing in place investments by local mills. Both analyses are documented in FSEIS Appendix B Section VI.

Technically, the Forest has a horizontal demand curve; the Forest can harvest a fixed amount of timber at any price up to a given harvest level at which point the demand falls to zero. This harvest level is called the "demand cut off point". Demand cut off points are included in the FORPLAN model according to timber demand Scenario D-2, (See FSEIS Appendix B Section VI).

Real Price Trends

Real price trends were not used in the analysis. Real price trends exaggerate the value of resources over the 150 year planning horizon. In addition, real increases in costs would also have to be used to insure that the analysis is fair. A more conservative approach is to assume that real price trends for all resources will be the same. The economic efficiency analysis therefore uses the relative values of different resources which the Forest now knows, as opposed to using predicted future relative values which usually defy prediction.

Real Cost Trends

A zero percent real cost trend is used for all future costs included in the development of the benchmarks and alternatives to insure that the analysis is fair. A zero percent real cost trend is also used for all benefits.

Real Dollar Adjustments

All benefits and costs used in the Forest Planning process were expressed in real 1982 dollars, consistent with the 1985 RPA program. The Gross National Product implicit price deflator index was used to convert both historical and current nominal prices and costs to parity with the 1982 base year (FSM 1971.32b).

Costs Used for Economic Efficiency Analyses

The cost section describes the costs used to perform economic efficiency analyses for each of the benchmarks and alternatives considered during the development of the FSEIS. The analyses considered only timber-related costs, as all other costs will remain unchanged by the FSEIS and Forest Plan Amendment. The costs were identified using the National Information Requirements Project (NIRP) codes as described in FSH 1309.16. The NIRP activity descriptions and associated codes were useful for identifying how different costs would be treated during the planning process. Each cost was categorized as either a fixed or a variable timber cost. Variable costs change with different levels of timber management. Fixed costs represent a fixed timber program management cost or a fixed number of units of a given timber activity which do not change between the alternatives. Costs were determined by examining: (1) program budget planning files and (2) the Alternative 1G proposed ten-year timber sale action plan. Professional judgment was also an important factor. All costs were developed and reviewed by the Forest Operations Research Analyst and the appropriate Forest staff. The following discussion presents how costs were incorporated into the efficiency analyses for each benchmark and alternative.

Costs Considered to be Fixed Across Alternatives and Benchmarks

A cost was classified as "fixed" if the cost:

- was not expected to vary significantly over the range of alternatives considered,
- could not be tied to specific activities within any of the prescriptions,
- represented a very small and insignificant amount of the forest budget,
- had insufficient cost records to support assumptions about when or how much the cost would vary as different prescriptions were implemented, or
- was not related to timber production or mitigating timber production effects.

Table B-IV-1 lists the fixed timber costs developed for the FSEIS. The fixed timber costs do not vary between benchmarks or alternatives. Fixed costs are those which would be constant between the alternatives. Fixed costs are used in calculating PNV and in estimating timber program break-even prices.

Table B-IV-1.

ACTIVITY	FIXED COSTS FOR THE FOREST PLAN AMENDMENT			COST IN 1982 DOLLARS
	NIRP	UNITS	FIXED UNITS	
TIMBER RESOURCE INVENTORY	ET111	ACRE	2000.00	\$7,240.20
TIMBER RESOURCE PLANNING	ET112			\$101,636.54
SITE PREP FOR NATURAL REGEN	ET241	ACRE	220.00	\$17,648.72
REFORESTATION SEEDING	ET242	ACRE	100.00	\$8,190.28
REFORESTATION PLANTING	ET243	ACRE	10.00	\$3,548.90
TIMBER STAND IMPROVEMENT	ET252	ACRE	200.00	\$18,171.49
GENETIC TREE ACTIVITIES	ET27			\$3,407.16
			TOTAL FIXED COSTS	\$159,843.28

Costs Considered to be Variable Across Alternatives

Variable costs were tied to activities within a FORPLAN prescription and were expressed as costs per acre or costs per unit of output (i.e., dollars per MCF, dollars per ACRE, etc.).

In general, FORPLAN contained all of the variable costs associated with harvesting timber, including local road construction costs. For each FORPLAN cost category, a range of costs was entered into the model (See FORPLAN data set section 3.4 in Forest Planning Files R-1920-2-1-P) based on the management prescriptions and the characteristics of the analysis areas to which the costs applied. The Forest's resource staff developed variable costs by reviewing program budgets, by reviewing the proposed Alternative 1G ten-year timber sale action plan, and by using professional judgement. Table B-IV-2 presents some broad FORPLAN cost categories and units of measure as well as the range of costs included in the analysis. For additional information, see paper titled "Cost Documentation for the GMUG Forest Plan Amendment FEIS Analysis" available in the Forest Supervisor's Office (Forest Planning Files R-1920-2-1-u).

TABLE B-IV-2

CODES AND ACTIVITIES MODELED AS VARIABLE COSTS

NIRP CODE	ACTIVITY	VARIABLE COST 1982 DOLLARS
ET111	STAGE II INVENTORY	\$2.62/ACRE
ET114	TIMBER SALE PREPARATION	\$13.80 - 52.53/MCF
ET114	TIMBER SALE PREP PROGRAM MGT	\$11.25 - 13.50/MCF
ET113	RANGE SUPPORT	\$1.47 - 1.76/MCF
ET113	WILDLIFE & FISH TIMBER SUPPORT	\$3.40 - 5.10/MCF
ET113	VISUAL RESOURCE TIMBER SUPPORT	\$0.79 - 3.16/ACRE
ET113	CULTURAL RESOURCE TIMBER SUPPORT	\$14.63 - 17.55/ACRE
ET113	SOIL & WATER TIMBER SUPPORT	\$1.58 - 2.37/ACRE
ET113	MINERALS & ENERGY TIMBER SUPPORT	\$0.55 - 0.66/MCF
ET113	AIR & FIRE TIMBER SUPPORT	\$1.47 - 1.76/MCF
ET112	TIMBER SALE ADMINISTRATION	\$14.01 - 19.26/MCF

TABLE B-IV-2 (continued)

CODES AND ACTIVITIES MODELED AS VARIABLE COSTS

NIRP CODE	ACTIVITY	VARIABLE COST 1982 DOLLARS
ET121	REFORESTATION SUCCESS INVENTORY	\$0.86 - 1.03/ACRE
ET241	SITE PREP FOR NATURAL REGENERATION	\$77.64 - 129.40/ACRE
ET25	PRECOMMERCIAL THIN	\$86.27 - 113.22/ACRE
ET251	RELEASE & WEED	\$51.33 - 67.94/ACRE
LT214	LOCAL ROAD ENGINEERING	\$4,246.71 - 10,181.80/MILE
LT22	LOCAL ROAD CONSTRUCTION/RECONSTRU	\$9,237.53 - 31,751.20/MILE
LT22	LOCAL ROAD CLOSURE	\$0.84 - \$1.69/ACRE
LT23	LOCAL ROAD MAINTENANCE	\$38.76/MILE

Benefits Considered for Economic Efficiency Analysis

Both priced and non-priced benefits were incorporated in the benchmark and alternative economic efficiency analyses. Dollar value resource outputs constitute the priced benefits included in the PNV calculations. Like all of the costs included in the analyses, benefits incurred during the 150-year planning horizon were incorporated in the PNV calculations. The economic efficiency analysis for each alternative also considered non-priced benefits. A subjective qualitative value was attributed to non-priced benefit production. Conceptually, the addition of the non-priced benefits to PNV is used to derive the net public benefits associated with each alternative. Both priced and non-priced outputs and their associated values are summarized below.

Priced Benefits Considered for Economic Efficiency Analysis

All priced benefits are determined from the standpoint of the Forest. Only benefits directly related to Forest activities are counted as priced benefits. For example, the value of an RVD of recreation is the additional amount an average visitor would pay to cross the Forest boundary after he has already put time and money into reaching the Forest boundary. The benefit value does not claim credit for the profits made by the motel, the grocery store, or the gas station. The Forest only takes credit for the portion of a recreation visitor day which occurs on the Forest.

The resources for which values were estimated on the Grand Mesa, Uncompahgre & Gunnison National Forest consisted of timber and water augmentation. Timber is a market-priced benefit, while water augmentation is a nonmarket-priced benefit. The process for deriving each of the values will be explained briefly below.

Water Resource Benefit Values

Originally the water benefit value used in the benchmark analysis came from the 1985 RPA benefit value and was \$19.43/acre-foot in 1982 dollars. The water value was obtained by taking only the portion of the 1985 RPA Region 2 benefit value for the Upper Colorado River Basin since the Forest's water flows only into the Upper Colorado River Basin. During the Supplemental AMS comment period, the water benefit value was questioned by various public interest groups as being too high in light of an unpublished report by Thomas C. Brown

of the USDA Forest Service Rocky Mountain Forest and Range Experiment Station ("Consumptive Use of Flow Increases in the Colorado River Basin"). The RPA water value is a consumptive use value, and the Brown paper suggested that all but about 10% of the water flowing off the Forest either evaporates or is flushed out into the Gulf of California during flood years.

The Forest then contracted with the Rocky Mountain Experiment station, Thomas C. Brown, and a private consultant (WBLA, Inc., Boulder Colorado) to specifically research the question of the value of water yield increases from the Forest. As a result, a supplemental water benefit value was developed, which is described below.

The supplemental water benefit value used was developed specifically for the Forest based on site specific modeling of the river systems on and below the Forest and on the specific uses made of Forest water. Researchers discovered that additional acre-feet of water produced from the Forest would be used for local consumption, downstream consumption, hydropower production, and salt dilution. On pages 28 and 29 of the marginal water value study conducted by Brown, Harding & Payton ("Marginal Economic Value of Runoff From The Grand Mesa, Uncompahgre & Gunnison National Forest" May 19, 1988, By Thomas C. Brown of the Rocky Mountain Forest & Range Experiment Station, and Benjamin L. Harding & Elizabeth A Payton of WBLA, Inc. See Forest Planning Records R-1920-2-1-[o]), Brown recommends a water benefit value for the Forest. The values are as follows:

TABLE B-IV-3

Determination of Forest Water Benefit Value

Upper Basin Consumptive use	\$0.01/acre-foot
Lower Basin Consumptive Use	\$1.15/acre-foot
Hydropower	\$24.92/acre-foot
Salt Dilution	\$11.99/acre-foot
TOTAL IN 1985 DOLLARS	\$38.07/acre-foot
TOTAL IN 1982 DOLLARS	\$34.14/acre-foot

Table B-IV-3 values were selected by Brown as the most likely to occur in the near future. The \$34.14/acre-foot water value is used in FORPLAN.

Demand cut-off points were not applied to water benefit values since the demand analysis did not establish an upper limit to water demand.

Timber Resource Benefit Values

The FSEIS timber benefit value was calculated on a high-bid value basis for the period 1988 to 1990 using timber sale prices from the Forest's annual Cut & Sold Reports (See Forest Planning Files R-1920-2-1-u). The recent year average was used to obtain a more accurate estimate of current prices due to recent changes in minimum and standard rates as well as an increase in appraised rates due to changes in appraisal procedures. Data collected from previous years does not reflect the price change and more would not do as good a job of predicting future timber prices as the current data. All values were adjusted to 1982 dollars and a volume-weighted average was then calculated. Where historic average harvest prices were below current standard rates found in FSM

2431.42--1, the standard rate was used. Generally, the standard rate is the price charged for timber when an appraisal is not conducted (FSM 2431.42-1 5/86 R-2 SUPP 327).

The Forest normally does not sell timber on steep (greater than 40%) slopes. Harvesting timber on steep slopes generally costs a timber purchaser more to harvest and would be expected to bring a lower stumpage price than timber on low slopes. A steep-slope timber price was needed, however, to do an adequate analysis of the efficiency of timber harvesting on the Forest. The timber appraisal handbook indicated that the additional cost of harvesting timber on steep-slopes was \$40.00/MCF in 1986 dollars (See FSH 2409.22 Chap 01.9 9/86 R-2 Supp 82). The steep-slope stumpage prices were calculated by subtracting the steep-slope logging cost from the price of low-slope timber. The resulting price was used for steep-slope timber unless it was lower than the minimum stumpage prices in FSM 2431.42--2; then the minimum rate was used.

Demand cut-off points were applied to timber resource benefit values. The benefit values are presented in Table B-IV-4 below.

Table B-IV-4

Resource Benefit Values Used in the Benchmarks & Alternatives
in 1982 Dollars

WATER			
Increased Water Yield		\$34.14/Acre-Foot [#]	
TIMBER			
Product	Species	Low Slopes 0-40%	Steep Slopes 40% +
Sawtimber	ES-AF-DF	\$109.61/MCF	\$75.15/MCF
	Ponderosa Pine	\$98.40/MCF	\$63.94/MCF
	Lodgepole Pine	\$75.60/MCF	\$41.14/MCF
	Aspen	\$43.81/MCF	\$21.09/MCF
TIMBER			
Product	Species	Low Slopes 0-40%	Steep Slopes 40% +
Products Other Than Logs (POL)			
	Lodgepole Pine	\$42.68/MCF	\$24.71/MCF
	Aspen	\$44.23/MCF	\$24.71/MCF

Non-priced Outputs Considered in Economic Efficiency Analysis

The calculation of PNV enables the comparison of alternatives by their efficiency in producing priced resources. However, other factors also influence the decision-making process. In some cases, the importance of non-priced benefits, which cannot be assigned monetary values, outweigh the

advantages of producing higher levels of priced outputs. The importance in considering subjectively valued non-priced benefits in forest management decision making is addressed in the NFMA Regulations which charge the Forest Service with identifying the alternative which comes nearest to maximizing net public benefits (36 CFR 219.12(F)).

Net public benefits (NPB) represent the overall value to the nation of all outputs and positive effects (benefits), minus all associated inputs and negative effects (costs), whether the costs and benefits can be quantitatively valued or not (36 CFR 219.3). Net public benefits include both priced and non-priced resource outputs, minus all costs associated with managing the area. As stated earlier, all priced outputs and all costs associated with managing the Forest are included in the calculation of PNV. The net subjective values of the non-priced outputs must be considered in order to arrive at the overall NPB of an alternative.

Chapter II of the FSEIS Table II-10 lists the Indicators of Responsiveness. The Indicators of Responsiveness include the priced and non-priced outputs and effects which were used to identify Alternative 1G as the Preferred Alternative.

V. - SOCIAL & ECONOMIC IMPACT ANALYSIS

Many communities and people in the Colorado area are dependent upon the Forest for their economic, recreational, and social way of life. Many of the issues, concerns, and opportunities reflect the importance of the Forest to both local and regional publics. Social and economic impact analysis evaluates economic and social consequences of implementing land management planning decisions.

Economic impact analysis evaluates the effect of management decisions on employment, personal income, and local government revenues within an area defined as the Forest's economic impact area.

Social impact analysis is the process of assessing how Forest Service decisions and policies affect human social life. Human social life is influenced by the surrounding physical and biological environment. The effect is most evident in rural areas where the variety and quality of available natural resources often determines the chief socioeconomic livelihood.

The Forest is made up of one social impact area (SIA H) and two economic impact areas (EIA 214 & EIA 215) which were identified in the original 1983 Forest Plan. The counties included in each impact area are as follows:

County	EIA	SIA
Delta	214	H
Mesa	214	H
Montrose	214	H
Ouray	214	H
San Miguel	214	H
Hinsdale	215	H
Gunnison	215	H
San Juan	215	H

Social Overview

Social impact analysis is the process of assessing how Forest Service decisions and policies affect human social life. Human social life is influenced by surrounding physical and biological environments. The effect is most evident in rural areas where the variety and quality of available natural resources often determines the chief means of socioeconomic livelihood and, therefore, influence local preferences for the use of public lands. Proposed changes in the availability or permitted uses of National Forest resources are of importance to residents of affected communities, commercial users, and recreational users. Other people, including many who seldom visit the Forest, also have a strong interest in how forest resources are managed.

The social analysis framework was developed under the guidance of FSH 1909.17 "Economic and Social Analysis." Essentially, the process consisted of delineating and categorizing different Forest user groups within the local area and surrounding regions in which the social environment could be affected by land management planning decisions and then identifying the effects which might result from the implementation of each alternative.

Forest Influence Zone for Social Analysis

People and communities in the influence zone have different ties to the Forest. The nature of the alternatives displayed in the FSEIS could affect each community or interest group differently. People using the Forest were divided into two sub-groups for purposes of analyzing social effects. The sub-groups, described below, were identified by ties between the Forest and the users. One tie between the Forest and users is the Forest's contribution of raw material for industry and the jobs which the industries provide. A second tie is the scenic and recreational environment the Forest offers to recreationists and residents. Both user groups have clear bonds with the Forest, but some overlap does exist.

Entities with Direct Economic Ties to the Forest

Local rural and industrial communities are closely tied to the Forest for subsistence and are directly affected by what happens on the Forest. Obvious links between the Forest and the communities are: water for agriculture; forage for domestic livestock; and logs for harvesting, manufacturing, and transportation businesses. The resources provide employment and revenue to the communities. People living in the communities use fuelwood, fish, and game for part of their subsistence.

Entities with Indirect Aesthetic and Recreation Ties to the Forest

The provision of diverse recreation opportunities on the Forest is a major attraction of the area. Recreation (often roaded and/or motorized) is an important component of the lifestyle of one segment of the community. Another segment views the Forest as a place to find solitude and to escape from the noise and urgency of urban living.

While activities on the Forest do not directly affect the daily lives of people in distant communities, management decisions on the Forest are likely to be seen as symbolic of broader issues. Responses to management decisions may reflect the position of specific interest groups rather than the sentiment of local residents who are directly affected by the issues.

In larger and more diverse communities, some conflicts over management of the Forest can be absorbed without much disruption to the community. While more sensitive issues tend to pull people together within the smaller communities, they tend to polarize larger communities which have both economic and emotional ties to the Forest.

Social Effects

The Forest Service plays an integral role in the socioeconomic environment of the Forest vicinity. Accordingly, decisions which significantly change Forest Service land use policies and/or resource output levels can have socioeconomic consequences. In order to evaluate the potential consequences associated with the implementation of land management planning decisions, three categories of social effects were identified which would be directly linked to the alternatives. They are: (1) jobs and lifestyles; (2) attitudes, beliefs, and values; and (3) social organizations.

Jobs and Lifestyles

Management of the Forest has direct, indirect, and induced effects on many different aspects of the employment base in the Forest vicinity. Management also can have effects on people's lifestyles. Effects on jobs and lifestyles are created by actions which (1) change employment opportunities, (2) change the diversity of recreational opportunities, (3) change the freedom to use the Forest for subsistence and recreation because of increased regulation and/or resource conflicts, and (4) change the environmental qualities of the area.

Attitudes, Beliefs, and Values

Actions which change Forest-related attitudes, beliefs, and values are social effects. Attitudes, beliefs, and values include the feelings, preferences, and expectations people have for the Forest and the management and use of particular areas. Attitudes, beliefs, and values of different groups may conflict. One group wants to use the Forest's commodity outputs while another group wants to enjoy the Forest's aesthetic qualities. One group wants to preserve specific Forest sites in a natural state while another group wants to develop the same areas for other uses.

Social Organization

Social organization is the structure of a society described in terms of roles, relationships, norms, institutions, and infrastructure. Organization refers to a community's capacity to define problems, including change, and to resolve those problems without major hardships or disruptions to component groups or institutions. Organization also includes the concepts of community stability and community cohesion. Both concepts are related to the sense of belonging associated with mutual community interests and goals. In a community where smaller groups have a high degree of internal cohesion, a Forest Service action which is interpreted as being in favor of one group may become the focus of a problem for the community and result in polarization. Forest Service decisions can either aggravate or help to alleviate existing conflicts.

Social Impact Analysis

Once the analysis of economic impacts in terms of jobs, personal income, and the returns to government were completed, the anticipated social impacts resulting from implementation of each alternative were assessed. As described above under the "Social Effects" section, some of the social impacts could be tied to anticipated changes in the economic well-being of the eight-county area as estimated by the Forest's IMPLAN model. However, not all of the social impacts are directly linked to concerns about jobs and income. Some of the social impacts revolve around the attitudes, beliefs, and values of different groups of citizens who are influenced either directly or indirectly by Forest management decisions. Sensitive issues regarding how the Forest should be managed polarize some groups against others as each group attempts to influence Forest Service decisions and policies.

Gradual changes to the social structure of a community are inevitable and are usually a part of the growth and development of any community. Drastic, rapid changes can, however, be destructive to a community. Examples of drastic, rapid

changes include the building of a major destination ski area and town, the opening of a major mining operation employing thousands of new workers, or the Western Colorado oil shale boom and bust of the early 1980's. Drastic rapid changes may either cause the existing social infrastructure to be overwhelmed by a large influx of people with different social values or cause a large part of the existing social infrastructure to disappear as a major way of life disappears from the community.

None of the alternatives considered during the amendment process will cause drastic rapid changes in local communities. The total number of jobs will, at most, be changed by .66%. The local timber industry employs less than 2% of the local work force, and the amount of recreation use on the Forest will be largely unaffected by the logging activities proposed in the alternatives.

With regard to other social impacts, various groups will be affected differently depending on the nature of the alternative being considered. The principal effects on the social environment are often related to the degree of change from current or historic output levels and/or character of the Forest. The effects will depend on the nature of the alternative being considered. Alternatives proposing the largest changes appear to have greater potential impacts. Commodity-oriented alternatives such as Alternative 1E, tend to do well in maintaining the economic aspects of the social structure in the area; patterns of work are supported or enhanced by resource supplies provided by the Forest in these alternatives. Increased supplies of timber in particular, generally mean more, relatively higher paying, jobs. Individuals and communities which are more dependent upon the wood products industry will benefit from the higher volumes offered. On the other hand, alternatives that project reduced outputs of commodities such as Alternative 1D, will tend to decrease jobs based on traditional Forest use, principally timber.

Finances aside, other types of Forest Service decisions can influence the social well-being of Forest-dependent communities. Generally, individuals, groups, or communities which view or use the Forest from an amenity standpoint are positively impacted by amenity-oriented alternatives and negatively affected by alternatives with a commodity emphasis.

Perceptions and expectations can also be influenced by the alternatives. Timber harvest activities are the principal focal point of perceptions and expectations. Alternatives that project increased timber outputs tend to strengthen or reinforce the expectations and views of those supporting the use of forest resources and traditional economic values. The expectations and preferences of those with aesthetic or recreational ties to the forest will tend to have their views supported by alternatives featuring these values.

The implications apply to entire communities as well as to groups within the communities. Community and group cohesion may be correlated to the degree of change proposed in forest management. Decisions such as those regarding whether or not to develop roadless areas for timber harvesting and how much timber should be harvested at the expense of scenic quality as well as other noncommodity types of resources will tend to polarize groups with different values and to pull together groups with common values. Different issues may also change the composition of the groups.

To some degree the various groups tied to the Forest are inherently at odds due to their different perspectives on the Forest. However, almost all groups and communities can adapt to slow changes in their environment. Rapid and dramatic changes in the way the Forest is managed are likely to bring about some level of social disruption and create greater potential for increased conflicts in communities or groups. Alternatives that tend towards providing "a balanced approach" on the issues (i.e., more moderate changes) are expected to create fewer potential conflicts and increased community cohesion.

Economic Impact Analysis

Economic impact analysis relates to changes in employment and income due to changes in the levels of vegetation management occurring on the Forest. Income is of two types; income derived from labor or investments and payments to counties from 25% of all gross Forest receipts.

The IMPLAN model (Alward and others 1981) was used to perform the economic impact analysis for the FSEIS. IMPLAN is an input-output model and will not be discussed in detail. The reader is referred to the IMPLAN Analysis Guide (Alward et al. 1981, 1985) and several other papers which describe the IMPLAN system in detail. Input-output analysis is used to help evaluate the employment and income impacts associated with each of the alternatives considered in the Forest Plan amendment. The impacts were estimated for the first decade based on the timber outputs for each alternative.

Two different IMPLAN models were built for the Forest, one for EIA 214 and one for EIA 215. Adjustments were made to the EIA 214 (Grand Mesa) I/O Model to reflect the construction of a new waferwood plant. In addition, job and income effects for the new local waferwood industry were further adjusted outside of the IMPLAN model to eliminate double counting in the logging sector of EIA 214.

The new sector added to the EIA 214 I/O model was sector #171 Standard Industrial Classification (SIC) code 20.0902, particleboard. This industry came into the area after 1982, the year information was collected for IMPLAN version 2.0. Sector 171 does a good job of identifying the jobs and income for the waferwood mill, but includes only a portion of the logging jobs associated with waferwood production as an indirect effect.

Better information on the logging sector was provided by the waferwood industry in the form of the cost of getting logs to the waferwood mill in 1987. This figure was adjusted down to 1982 dollars and entered as a final demand for the logging sector.

Three different IMPLAN analyses were conducted for sector 171 to develop a better estimate of the job and income effects of the waferwood industry.

Analysis #1 evaluated the particle board (waferwood) sector alone as a way of estimating waferwood plant jobs and logging jobs associated with waferwood production.

Analysis #2 evaluated the logging (waferwood) sector alone as a way of estimating waferwood plant jobs and logging jobs associated with waferwood production.

Analysis #3 evaluated the particle board (waferwood) and the logging sectors as a way of estimating waferwood plant jobs and logging jobs associated with waferwood production.

The best method of estimating job and income effects from the local waferwood industry is to combine only the direct job and income effects of logging and processing waferwood woodfiber using the logging and particle board sectors.

Analysis #1 was completed by entering waferwood production as a direct effect and allowing IMPLAN to calculate logging jobs and income associated with waferwood production as an indirect effect. IMPLAN calculated logging jobs to be 18, which is far below the level estimated to log 32 MMBF of timber.

Analysis #2 was completed by entering payments to the logging industry for delivering woodfiber to the waferwood plant as a final demand and allowing IMPLAN to calculate direct job and income effects for logging waferwood woodfiber. The purpose of Analysis #2 was to determine the difference between calculating logging jobs indirectly in Analysis #1 and directly in Analysis #2. Analysis #1 calculated 18 jobs and Analysis #2 calculated 51 jobs.

Analysis #3 was completed by summing the results of Analysis #1 and Analysis #2 together. Analysis #3 double counts logging jobs by trying to estimate jobs both indirectly as a result of waferwood production and directly as a final demand.

The best estimate was obtained by taking Analysis #3 and subtracting out the logging jobs IMPLAN calculated indirectly. The indirect logging jobs were obtained by viewing the Indirect effects to the logging sectors (# 160 & #161) of analysis #1. Table B-V-1 below shows the calculations used in subtracting the indirect logging effects out of Analysis #3.

TABLE-B-V-1

CALCULATIONS FOR WAFERWOOD INDUSTRY JOB & INCOME EFFECTS

	EMPLOYEE COMPENSATION	PROPERTY INCOME	TOTAL INCOME	JOBS
TOTAL - WAFERWOOD MILLING + WAFERWOOD LOGGING EFFECTS OF ANALYSIS #3				
DIRECT EFFECTS	\$3,499,500	\$1,350,000	\$4,849,400	190
INDIRECT EFFECTS	\$1,195,800	\$1,125,000	\$2,320,800	74
INDUCED EFFECTS	\$1,411,000	\$1,226,700	\$2,637,600	108
TOTAL	\$6,106,300	\$3,701,700	\$9,807,800	371
INDIRECT LOGGING EFFECTS CALCULATED BY IMPLAN IN ANALYSIS #1				
SECTOR 160	\$54,400	\$26,600	\$81,000	3
SECTOR 161	\$138,700	\$31,300	\$170,000	15
TOTAL	\$193,100	\$57,900	\$251,000	18

TABLE-B-V-1 (continued)

	EMPLOYEE COMPENSATION	PROPERTY INCOME	TOTAL INCOME	JOBS
CORRECTED WAFERWOOD MILLING + WAFERWOOD LOGGING EFFECTS (Total Analysis #3 effects minus Analysis #1 Indirect logging effects)				
DIRECT EFFECTS	\$3,499,500	\$1,350,000	\$4,849,400	190
INDIRECT EFFECTS	\$1,002,700	\$1,067,100	\$2,069,800	56
INDUCED EFFECTS	\$1,411,000	\$1,226,700	\$2,637,600	108
TOTAL	\$5,913,200	\$3,643,800	\$9,556,800	353

The Corrected Effects for the total 32 MMBF of waferwood production were converted to job and income effects per MMCF. This was done by dividing the coefficients in the table above by 8 (32 MMBF * 1MMCF/4MMBF = 8 MMCF). MMCF were used instead of MMBF, as MCF will be the measurement unit for waferwood in the future.

TABLE-B-V-2

CORRECTED WAFERWOOD MILLING + WAFERWOOD LOGGING EFFECTS PER MMCF IN 1982 DOLLARS

DIRECT EFFECTS	\$437,438	\$168,750	\$606,175	23.76
INDIRECT EFFECTS	\$125,338	\$133,388	\$258,725	6.96
INDUCED EFFECTS	\$176,375	\$153,338	\$329,700	13.45
TOTAL	\$739,150	\$455,475	\$1,194,600	44.17

IMPLAN is a completely linear economic impact model. Therefore, the model was run only once to get the response coefficients per 1000 resource units or per one million dollars of government expenditure. The response coefficients were then entered into a spreadsheet to enable the Forest to multiply the coefficients by the outputs of each alternative to estimate job and income effects for each alternative. The job and income spreadsheet for Alternative 1A can be found in Table B-V-3. The corrected waferwood coefficients, Table B-V-2, were substituted for the standard IMPLAN waferwood production coefficients. Outputs for each alternative were entered into the spreadsheet to obtain total job and income effects for a given alternative.

Table B-V-3 is the spreadsheet used to calculate job and income effects for DSEIS Alternative 1A and is representative of the spreadsheets used to calculate job and income effects for all FSEIS alternatives. Table B-V-3 consists of two parts: job and income effects for EIA 214, and job and income effects for EIA 215. The first column in Table B-V-3 is simply the name of the output, a reference to the units of measure, and the economic impact area. The second column is the output amount and the percent of total Forest output occurring in the EIA in question. The third column identifies the type of effect (See Alward et al., 1981, 1985). The next six columns occur in pairs. The first column of each pair identifies a coefficient which, when multiplied by the amount of output (column 2), gives the level of effect. For example 67,300 times 31.48 MMBF equals \$2,118,739 in employee income. The three pairs of columns relate to employee income, property income, and jobs.

Due to the nature of the alternatives only sawtimber, waferwood, government administration expenditures, government operation and maintenance expenditures, and government capital investment expenditures change by alternative. Government expenditures are Forest budget costs.

For more detail refer to IMPLAN, Version 1.1: Analysis Guide (Palmer and others 1985), and Interim IMPLAN User's Guide Version 2.0 June 1987.

The number of jobs estimated through IMPLAN were compared with the Colorado Department of Labor and Employment Labor Market Information (CDL) estimates in a publication entitled "Colorado Labor Force Review Data Supplement 1988 (See Forest Planning files R-1920-2-1-[x])." The CDL indicates that 1982 total job estimates were higher than those estimated in IMPLAN which also used 1982 as a base. The CDL indicates that 1987 job estimates were significantly lower than the 1982 CDL estimates, and slightly lower than the jobs estimated by IMPLAN for 1982. The current IMPLAN job estimates and the CDL job estimates for 1982 and 1987 are listed below.

TABLE B-V-4
COMPARISON OF JOBS ESTIMATED BY THE STATE OF COLORADO
AND IMPLAN

EIA	CDL 1982 JOBS	CDL 1987 JOBS	IMPLAN JOBS
214	62,106	55,777	58,847
215	6,268	5,949	5,316

Table B-V-4 above indicates that the local economies in the Forest area have not recovered from the recent recession; IMPLAN job estimates tend to underestimate 1982 CDL jobs by about 6 percent and overestimate 1987 CDL jobs by about 4 percent. The CDL estimates are considered more accurate than the IMPLAN estimates because the CDL uses actual employment statistics, while IMPLAN is a simulation model which uses national production functions to estimate jobs. Generally, IMPLAN is a good predictor of jobs when compared to the CDL job estimates.

Table B-V-3

Job & Income Effects Spreadsheet For Alternative Analysis
1982 Dollars

EIA 214 - GRAND MESA I/O MODEL COVERING
DELTA, MESA, MONTROSE, OURAY & SAN MIGUEL COUNTIES

OUTPUT NAME	OUTPUT AMOUNT	IMPACT TYPE	EMPLOYEE INCOME COEFFICIENT	EMPLOYEE INCOME	PROPERTY INCOME COEFFICIENT	PROPERTY INCOME	JOB COEFFICIENT	JOBS
MMBF SAWTIMBER	31 48	DIRECT	67,300	\$2,118,739	15,200	\$478,526	7 28	229 19
EIA 214 %	100 00%	INDIRECT	19,300	\$607,603	10,900	\$343,154	1 17	36 83
		INDUCED	41,500	\$1,306,503	36,100	\$1,136,500	3 16	99 48
		TOTAL		\$4,032,844		\$1,958,180		365 51
MMCF OF WAFERWOOD	1 64	DIRECT	437,438	\$717,835	168 750	\$276,919	23 76	38 99
EIA 214 %	100 00%	INDIRECT	125,338	\$205,679	133,388	\$218,889	6 96	11 42
		INDUCED	176,375	\$289,431	153,338	\$251,627	13 45	22 07
		TOTAL		\$1,212,945		\$747,434		72 48
MRVD OF CAMPING	282 31	DIRECT	2,000	\$564,619	600	\$169,386	0 20	56 46
EIA 214 %	52 63%	INDIRECT	500	\$141 155	500	\$141,155	0 04	11 29
(NONWILD CAMPING)		INDUCED	900	\$254,078	800	\$225,848	0 07	19 76
		TOTAL		\$959,852		\$536,388		87 52
MRVD OF PICNICING	239 83	DIRECT	4,600	\$1,103,200	1,400	\$335,757	0 46	110 32
EIA 214 %	79 41%	INDIRECT	1,200	\$287,791	1,200	\$287,791	0 10	23 98
(NONWILD DAY USE)		INDUCED	2,100	\$503,635	1,900	\$455,670	0 16	38 37
		TOTAL		\$1,894,627		\$1,079,218		172 67
MRVD OF SCENIC DRIVING	402 41	DIRECT	7,200	\$2,897,366	2,200	\$885,306	0 75	301 81
EIA 214 %	73 29%	INDIRECT	1,800	\$724,341	1,800	\$724,341	0 15	60 36
(MOTORIZED TRAVEL)		INDUCED	3,400	\$1 368,201	3,000	\$1,207,236	0 26	104 63
		TOTAL		\$4,989,908		\$2,816,884		466 80
MRVD OF DOWNHILL SKIING	120 46	DIRECT	64,100	\$7,721,686	23,100	\$2,782,698	7 61	916 72
EIA 214 %	36 06%	INDIRECT	17,800	\$2,144,243	15,200	\$1,831,039	1 35	162 63
		INDUCED	44,000	\$5,300,377	38,200	\$4,601,691	3 35	403 55

		TOTAL		\$15,166,307		\$9,215,429		1,482 90
MRVD OF BACKPACKING 23 63		DIRECT	2,900	\$68,530	900	\$21,268	0 31	7 33
EIA 214 % 33 60%		INDIRECT	800	\$18,905	700	\$16,542	0 06	1 42
(WILDERNESS CAMPING)		INDUCED	1,400	\$33,083	1,200	\$28,357	0 11	2 60
		TOTAL		\$120,517		\$66,166		11 34
MRVD OF DAY HIKING 23 86		DIRECT	4,600	\$109,736	1,400	\$33,398	0 48	11 45
EIA 214 % 49 41%		INDIRECT	1,200	\$28,627	1,200	\$28,627	0 09	2 15
(WILDERNESS DAY USE)		INDUCED	2,200	\$52,482	1,900	\$45,326	0 17	4 06
		TOTAL		\$190,845		\$107,350		17 65
MRVD OF BIG GAME 140 14		DIRECT	22,200	\$3,111 133	7,100	\$995,002	2 07	290 09
HUNTING		INDIRECT	5,000	\$700,706	5,700	\$798,805	0 39	54 66
EIA 214 % 43 99%		INDUCED	9,300	\$1,303,313	8,100	\$1,135,143	0 71	99 50
		TOTAL		\$5,115,152		\$2,928,950		444 25
MMRV OF SMALL GAME 5 59		DIRECT	11,000	\$61 464	3,200	\$17,880	0 90	5 03
HUNTING		INDIRECT	2,600	\$14,528	3,300	\$18,439	0 19	1 06
EIA 214 % 40 59%		INDUCED	4,100	\$22,909	3,600	\$20,115	0 32	1 79
(OTHER GAME USE)		TOTAL		\$98,901		\$56,435		7 88
MRVD OF FISHING 207 64		DIRECT	17,400	\$3,612,946	5,200	\$1,079,731	1 78	369 60
EIA 214 % 86 64%		INDIRECT	3,700	\$768,270	3,800	\$789,034	0 31	64 37
		INDUCED	7,900	\$1,640,360	6,900	\$1,432,720	0 61	126 66
		TOTAL		\$6,021,576		\$3,301,485		560 63
MAUM OF COWS 144 36		DIRECT	2,200	\$317,593	1,100	\$158,797	0 35	50 53
GRAZING		INDIRECT	2,800	\$404,210	3,900	\$563,006	0 21	30 32
EIA 214 % 73 19%		INDUCED	2,100	\$303,157	1,800	\$259,849	0 16	23 10
		TOTAL		\$1,024,960		\$981,652		103 94
MAUM OF SHEEP 87 94		DIRECT	6,700	\$589,171	3,500	\$307,776	1 07	94 09
GRAZING		INDIRECT	8,700	\$765,043	12,000	\$1,055,232	0 64	56 28
EIA 214 % 83 16%		INDUCED	6,500	\$571,584	5,600	\$492,442	0 50	43 97
		TOTAL		\$1,925,799		\$1,855,450		194 34
MILLION DOLLARS 5 49		DIRECT	284,300	\$1,561 340	118,000	\$648,041	20 43	112 20
OF GOVERNMENT ADMIN		INDIRECT	59,400	\$326,217	54,800	\$300,955	3 99	21 91
EXPENDITURES		INDUCED	127,800	\$701,861	111,100	\$610,147	9 75	53 55

EIA 214 %	86 00%	TOTAL		\$2,589,419		\$1,559,143		187 66
MILLION DOLLARS	3 09	DIRECT	79,400	\$245,281	31,200	\$96,382	6 31	19 49
OF GOVERNMENT O&M		INDIRECT	25,100	\$77,538	27,800	\$85,879	1 73	5 34
EXPENDITURES		INDUCED	39,500	\$122,023	34,300	\$105,959	3 01	9 30
EIA 214 %	86 00%	TOTAL		\$444,842		\$288,220		34 14
MILLION DOLLARS	1 32	DIRECT	272,700	\$359,601	37,100	\$48,923	8 73	11 51
OF GOVERNMENT CAPITOL		INDIRECT	90,100	\$118,812	72,300	\$95,340	4 57	6 03
INVESTMENT		INDUCED	65,300	\$86,109	56,800	\$74,900	4 98	6 57
EIA 214 %	86 00%	TOTAL		\$564,522		\$219,163		24 11
		TOTAL DIRECT		\$25,160,239		\$8,335,790		2,624 81
		TOTAL INDIRECT		\$7,333,668		\$7,298,228		550 05
		TOTAL INDUCED		\$13,859,108		\$12,083,530		1,058 95
		TOTAL EFFECTS		\$46,353,015		\$27,717,547		4,233 81

EIA 215 - GUNNISON I/O MODEL COVERING
GUNNISON, HINSDALE & SAN JUAN COUNTIES

OUTPUT NAME	OUTPUT AMOUNT	IMPACT TYPE	EMPLOYEE INCOME COEFFICIENT	EMPLOYEE INCOME	PROPERTY INCOME COEFFICIENT	PROPERTY INCOME	JOB COEFFICIENT	JOBS
MMBF LOGGING	1 00	DIRECT	29,600	\$29,600	14,400	\$14,400	1 70	1 70
(EIA 215 DOES NOT HAVE		INDIRECT	3,800	\$3,800	2,000	\$2,000	0 26	0 26
A MILLING INDUSTRY)		INDUCED	4,800	\$4,800	4,600	\$4,600	0 50	0 50
		TOTAL		\$38,200		\$21,000		2 46
MRVD OF CAMPING	254 09	DIRECT	1,100	\$279,504	300	\$76,228	0 14	35 57
EIA 215 %	47 37%	INDIRECT	200	\$50,819	100	\$25,409	0 01	2 54
(NONWILD CAMPING)		INDUCED	400	\$101,638	400	\$101,638	0 04	10 16
		TOTAL		\$431,961		\$203,276		48 28
MRVD OF PICNICING	62 18	DIRECT	2,500	\$155,460	700	\$43,529	0 33	20 52
EIA 215 %	20 59%	INDIRECT	300	\$18,655	300	\$18,655	0 03	1 87
(NONWILD DAY USE)		INDUCED	900	\$55,965	800	\$49,747	0 09	5 60
		TOTAL		\$230,080		\$111,931		27 98
MRVD OF SCENIC	146 66	DIRECT	4,100	\$601,290	1,200	\$175,987	0 60	87 99
DRIVING		INDIRECT	600	\$87,994	600	\$87,994	0 05	7 33
EIA 215 %	26 71%	INDUCED	1,600	\$234,650	1,500	\$219,984	0 17	24 93
(MOTORIZED TRAVEL)		TOTAL		\$923,933		\$483,965		120 26
MRVD OF DOWNHILL	213 60	DIRECT	47,600	\$10,167,354	18,100	\$3,866,158	7 13	1,522 97
SKIING		INDIRECT	7,200	\$1,537,919	6,700	\$1,431,119	0 65	138 84
EIA 215 %	63 94%	INDUCED	23,900	\$5,105,037	22,800	\$4,870,077	2 48	529 73
		TOTAL		\$16,810,311		\$10,167,354		2,191 53
MRVD OF BACKPACKING	46 70	DIRECT	1,700	\$79,389	500	\$23,350	0 25	11 67
EIA 215 %	66 40%	INDIRECT	200	\$9,340	200	\$9,340	0 02	0 93
(WILDERNESS CAMPING)		INDUCED	700	\$32,689	600	\$28,019	0 07	3 27
		TOTAL		\$121,418		\$60,709		15 88
MRVD OF DAY HIKING	24 43	DIRECT	2,600	\$63,506	800	\$19,540	0 38	9 28
EIA 215 %	50 59%	INDIRECT	400	\$9,770	400	\$9,770	0 03	0 73
(WILDERNESS DAY USE)		INDUCED	1,000	\$24,425	1,000	\$24,425	0 11	2 69

		TOTAL		\$97,701		\$53,736		12 70
MRVD OF BIG GAME	178 43	DIRECT	12,100	\$2,159,050	3,800	\$678,049	1 48	264 08
HUNTING		INDIRECT	1,400	\$249,807	1,300	\$231,964	0 12	21 41
EIA 215 %	56 01%	INDUCED	3,900	\$695,892	3,700	\$660,205	0 41	73 16
		TOTAL		\$3,104,749		\$1,570,218		358 65
MMRV OF SMALL GAME	8 18	DIRECT	5,100	\$41,710	1,300	\$10,632	0 61	4 99
HUNTING		INDIRECT	600	\$4,907	600	\$4,907	0 05	0 41
EIA 215 %	59 41%	INDUCED	1,600	\$13,085	1,500	\$12,268	0 17	1 39
(OTHER GAME USE)		TOTAL		\$59,702		\$27,806		6 79
MRVD OF FISHING	32 02	DIRECT	8,700	\$278,560	2,300	\$73,642	1 07	34 26
EIA 215 %	13 36%	INDIRECT	1,000	\$32,018	1,000	\$32,018	0 09	2 88
		INDUCED	2,800	\$89,652	2,700	\$86,450	0 29	9 29
		TOTAL		\$400,231		\$192,111		46 43
MAUM OF COWS	52 88	DIRECT	2,200	\$116,337	1,100	\$58,168	0 35	18 51
GRAZING		INDIRECT	1,400	\$74,032	2 100	\$111,049	0 13	6 87
EIA 215 %	26 81%	INDUCED	1,200	\$63,456	1,100	\$58,168	0 12	6 35
		TOTAL		\$253,825		\$227,385		31 73
MAUM OF SHEEP	17 81	DIRECT	6,700	\$119,308	3,500	\$62,325	1 07	19 05
GRAZING		INDIRECT	4,400	\$78,351	6,400	\$113,966	0 39	6 94
EIA 215 %	16 84%	INDUCED	3,600	\$64,106	3,400	\$60,544	0 37	6 59
		TOTAL		\$261,765		\$236,835		32 59
MILLION DOLLARS	0 89	DIRECT	245,800	\$219,752	98,400	\$87,972	23 92	21 39
OF GOVERNMENT ADMIN		INDIRECT	34,500	\$30,844	29,500	\$26,374	2 25	2 01
EXPENDITURES		INDUCED	84,500	\$75,545	80,700	\$72,148	8 78	7 85
EIA 215 %	14 00%	TOTAL		\$326,141		\$186,494		31 25
MILLION DOLLARS	0 50	DIRECT	46,500	\$23,384	25,600	\$12,874	5 03	2 53
OF GOVERNMENT O&M		INDIRECT	3,800	\$1,911	3,900	\$1,961	0 28	0 14
EXPENDITURES		INDUCED	13,000	\$6,538	12,400	\$6,236	1 35	0 68
EIA 215 %	14 00%	TOTAL		\$31,833		\$21,071		3 35
MILLION DOLLARS	0 21	DIRECT	272,700	\$58,540	37,100	\$7,964	8 73	1 87
OF GOVERNMENT CAPITAL		INDIRECT	37,000	\$7,943	18,100	\$3,885	2 47	0 53
INVESTMENT		INDUCED	41,600	\$8,930	39,800	\$8,544	4 32	0 93

EIA 215 %	14 00%	TOTAL	\$75,413	\$20,393	3 33
		TOTAL DIRECT	\$14,363,142	\$5,196,419	2,054 69
		TOTAL INDIRECT	\$2,194,311	\$2,108,412	193 45
		TOTAL INDUCED	\$6,571,609	\$6,258,454	682 60
		TOTAL EFFECTS	\$23,129,062	\$13,563,284	2,930 74

When estimating job and income effects for the alternatives, several logical adjustments were made outside of IMPLAN. All timber effects were assumed to come from EIA 214, because EIA 215 has a very small wood processing sector when compared to EIA 214. Due to the uncertain nature of the local waferwood plant, each alternative was ranked as to whether or not the plant would close. The ranking was used because as a single business which processes roughly half the Forest's woodfiber, the waferwood plant will either operate at current levels or it will go out of business. The waferwood plant is not expected to operate at intermediate levels. Alternative job and income effects were calculated for the sawtimber industry which consists of a number of local mills. Intermediate levels of production are more likely for this industry.

Changes in county payments from 25% of all Forest gross receipts were done by estimating future National Forest gross receipts from timber harvesting.

Variable National Forest receipts consisted of estimated gross timber receipts from FORPLAN. Other receipts were held constant across all alternatives at the 1989 level.

Returns to local governments are calculated as 25 percent of the gross receipts. The 25 percent funds are paid to the state of Colorado and are eventually passed on to local county governments based on the percentage of each county within each proclaimed Forest (Grand Mesa National Forest, Uncompahgre National Forest & Gunnison National Forest).

VI. ANALYSIS PRIOR TO DEVELOPMENT OF ALTERNATIVES

Introduction

Section VI documents Planning Step Four, Analysis of the Management Situation (AMS).

The AMS identifies the ability of the Forest to supply goods and services to society, evaluates the economic and financial efficiency of the Forest, and estimates resource demand projections.

Benchmark analysis is an integral part of the AMS. The benchmarks help define the maximum economic and biological resource production possibilities for the Forest and assist in evaluating the relationships between market and nonmarket goods and services. Each benchmark was developed to meet regional and national direction; address a specific issue, opportunity, or concern; or to test the sensitivity of the analysis to changes in basic assumptions. The FORPLAN benchmark runs estimate the schedule of management activities, resource outputs, effects, and PNV.

With few exceptions all benchmarks comply with the management requirements (MRs) of 36 CFR 219.27. Budgetary costs did not act as a constraint in any benchmark, but each benchmark was deemed "approximately" implementable.

A series of required and optional benchmarks was developed and analyzed in accordance with NFMA (36 CFR 219), Forest Service Direction (8/8/83; 1920 Land & Resource Management Planning; Subject - Procedural Direction Concerning Crowell Ltr./Revision; To - Regional Foresters; From Gary E. Cargill Associate Deputy Chief) and local issues & concerns. Several analytical tools were employed. The FORPLAN model was used to analyze the production capabilities, tradeoffs, and relative efficiency of different ways of producing big game winter range habitat, domestic livestock, timber, and water augmentation. The RIS data base was used to provide spatial information on the location of the Forest's analysis areas. An integrated spreadsheet/data base/business graphics program called Open Access II was used to further analyze and display benchmark FORPLAN allocations.

Benchmark analysis can be classified into one of three categories.

1. Analysis used to estimate maximum resource production possibilities.
2. Analysis used to determine the implications of legal and policy constraints.
3. Analysis used to test the sensitivity of the forest management to changes in basic assumptions, costs, or benefits.

Decision Space

The AMS analysis defines the "decision space" within which the Forest can operate to address the planning issues, concerns, and opportunities and thereby develop alternatives.

The benchmark analysis was performed in compliance with the national planning direction requirements for establishing benchmark levels for a non-significant timber producing Forest (See 8/8/83 FS memo to Regional Foresters, by Gary E. Cargill Associate Deputy Chief; 1920 Land & Resource Management Planning, Procedural Direction Concerning Crowell Ltr./Revision, See Forest Planning Records R-1920-2-1 (c)). The resulting benchmarks served as reference points from which the costs and effects of various objectives and constraints used in the subsequent development of alternatives were evaluated.

Benchmarks were formulated and analyzed in order to help define the production potentials and economic relationships of the market and nonmarket resources on the Forest. As mentioned above, many of the benchmarks were developed and analyzed in accordance with the National Forest Planning Direction (August 8, 1983). Others were developed to test the sensitivity of the timber harvesting program to changing timber demands. Each benchmark was formulated in terms of objectives, constraints, and assumptions.

Key Assumptions And Requirements For All Benchmarks

Prior to the development of each benchmark, many key assumptions were made for modeling purposes. In the following sections, the assumptions used for each major resource area are explained.

Demand

Demand was assumed to be unlimited for all benchmark runs in order to determine the biological and efficiency limits of production.

Domestic Livestock Production

Domestic livestock production will not be affected by timber harvesting.

Fish

Fishing use will not be affected by timber harvesting.

Recreation

Developed and dispersed recreation RVD levels will not be affected by timber harvesting.

Timber

Timber harvesting can only be considered on lands classified as tentatively suited for timber production. The actual acreage of tentatively suited lands used in FORPLAN amounts to 1,253,541 acres.

A perpetual timber harvest constraint guarantees that sufficient standing volume remains at the end of the planning horizon that the harvest pattern established could continue into perpetuity.

A sustained-yield link constraint restricts total harvest volume in the 15th decade to be less than or equal to the long run sustained-yield harvest.

Silvicultural timber prescriptions have been developed to provide for natural regeneration.

Transportation

Local timber roads are closed after timber harvest operations.

All collector and arterial roads needed for timber production are already in place, or at least will not change by alternative.

Wildlife

Big Game hunting RVDs and herd size will not be affected by timber harvesting.

Management requirements

Management requirements (MRs) are directed toward producing a viable level of resources for both the short- and long-term. These requirements stem from the National Forest Management Act as interpreted by the implementing regulations (36 CFR 219.27). The following sections of 219.27 contain the basic direction for MRs. These directions are:

1. Resource Protection
2. Vegetative Manipulation
3. Silvicultural Practices
4. Even-Aged Management
5. Riparian Areas
6. Soil and Water
7. Diversity

MRs are provided for in the GMUG's Uniform Management Prescriptions through the standards and guidelines (see Forest Plan Chapter III). Several MRs are linked to and constrain timber production, and are modeled in FORPLAN. They are:

Nondeclining Yield & Sustained-Yield Link - (36 CFR 219.16) The Forest is currently selling timber based on a policy of nondeclining even-flow. This constraint in the FORPLAN model is designed to ensure that the harvest levels in each decade are equal to or greater than the harvest in the previous decade. The harvest level in the last decade of the planning horizon must be less than or equal to the long run sustained-yield calculated for the alternative.

Ending Inventory Constraint - (36 CFR 219.16) This constraint attempts to ensure that the total inventory volume left at the conclusion of the harvest scheduling planning horizon (150 years) is sufficient to maintain the harvest pattern established for the given alternative.

Rotations at CMAI - (36 CFR 219.16) The constraint is intended to control the minimum age at which a timber stand can be regenerated. The minimum is determined by calculating the age at which the stand achieves 95 percent culmination of mean annual increment of timber volume growth. The constraint is applied through the individual prescription data as entered into the FORPLAN model.

Size of created openings and dispersion - (36 CFR 219.27 (b) & (d)) These constraints insure that individual cuts created by the application of even-aged silviculture shall conform to the Regional Guide direction on both dispersion of openings and maximum size limits for areas to be cut in one harvest operation.

The constraint helps limit the size of timber harvest units. The size of an opening will not exceed 40 acres. Clearcuts larger than 40 acres can, however, occur with Regional Forester approval and a 60 days public review period (36 CFR 219.27 (d)).

Dispersion constraints were applied to all timber harvests based on the relative percentage of acres in the ten year timber sale action plan for Alternative 1G and the total suited acres of Alternative 1G as determined by the Forest's Ranger Districts. The percentages are "less than or equal to" constraints. The model is limited to harvesting only a portion of any timber type within a single decade. The constraints generally reflect the dispersion needed to implement the Forest's Standards and guidelines as determined by experience on the Forest and the ten year timber sale action plan.

Wildlife and Fish - (36 CFR 219.27 (a)) All indicator species were evaluated for habitat requirements estimated to be necessary to maintain populations outside of FORPLAN.

Diversity - (36 CFR 219.27 (a)) An old growth constraint was applied to maintain diversity. Forest Direction (See Amended Forest Plan Chapter III page 4) is to maintain structural diversity with 5 percent or more of the forested area to be in old growth condition.

Soil and Water - (36 CFR 219.27 (a)) Costs associated with soil and water protection were included in all timber prescriptions. The timber harvest dispersion constraints also prevent excessive sediment production. Additionally, Forest-wide soil and water standards and guidelines (See Amended Forest Plan, Chapter III pages 45-46) provide direction which ensures the Forest will meet management requirements. The key standards and guidelines in riparian areas are:

- Maintain all riparian ecosystems in at least an upper mid-seral successional stage based upon the R2 Riparian Ecosystem Rating System.
- Provide mitigation measures necessary to prevent increased sediment yields from exceeding "threshold limits" (as determined by the "state of the art" HYSED model or by actual measurements) identified for each fourth-order watershed.
- Reduce to natural rate any erosion due to management activity in the season of disturbance. Reduce sediment yields within one year of the activity. Accomplish reductions through mitigation measures such as waterbarring and revegetation.

Supply & Efficiency Benchmarks

Data Summary

Following is a brief description of the supply & efficiency benchmarks developed for the Forest. The benchmark numbering scheme is standard for new benchmark analyses in Region 2.

Benchmark 1

Minimum Level (36 CFR 219.12(e)(1)(i)) - Specifies the minimum level of management needed to maintain the unit as part of the National Forest System and to manage uncontrollable outputs and uses. The benchmark ignores the transition period required to move from current to minimum level management.

The Minimum Level Benchmark is a determination of the minimum costs, and resultant outputs, needed to retain the Forest in federal ownership. The benchmark assumes a minimum work force necessary to protect the life, health, and safety of incidental users and adjacent private lands. This benchmark estimates the costs which are not discretionary in the program budget process and the resource outputs and uses which occur independent of management activities.

1. Objective Function - BM #1 was not analyzed in FORPLAN. It was, instead, determined by analyzing the minimum costs and benefits required to meet the NFMA definition of minimum level management. This information was organized on a microcomputer spreadsheet and the PNV was calculated there.
2. Land Base - All nonwilderness lands.
3. Constraints - None.

Benchmark 2A

Maximum Present Net Value Based on Established Market Price (36 CFR 219.12(e)(1)(iii)(A)) - Specifies the level of management which will maximize the present net value of outputs having an established market price (timber). Benchmark 2A was modeled as FSEIS Alternative 1F which was not analyzed in detail.

Benchmark 2A estimates the maximum PNV attained on the Forest by valuing only outputs with market values, subject to rotation age restrictions (95 percent CMAI), ending inventory, nondeclining yield, and the Forest's other multiple use MRs. The purpose of Benchmark 2A is to analyze the change in PNV and the efficient allocation when managing only for outputs which provide a return to the Treasury.

1. Objective Function - Maximize discounted timber net receipts for 15 decades.
2. Land Base - All tentatively suited lands.

3. Constraints -

- a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
- b. Rotations based upon 95 percent of Cumulation of Mean Annual Increment (CMAI).
- c. Ending inventory constraints.
- d. Management requirements for dispersion, and old growth.

Benchmark 3

Maximum Present Net Value Including Assigned Values without NDF (Forest Service direction for nonsignificant timber producing Forest) - Specifies the management level which will maximize the present net value of outputs having either an established market price or an assigned monetary value without nondeclining flow of timber production (NDF) as a constraint, but with all other MRs. Benchmark 3 was not reanalyzed between the Draft and the Final SEIS.

The purpose of Benchmark 3 is to identify the tradeoffs and opportunity costs of the nondeclining flow MR.

1. Objective Function - Maximize PNV for 15 decades.
2. Land Base - All nonwilderness lands.
3. Constraints:
 - a. Sequential upper and lower bounds of 1000 percent for 15 decades.
 - b. Harvest rotations are based on 95 percent of CMAI.
 - c. Ending inventory constraints.
 - d. Management requirements for visual quality, big game habitat, old growth for indicator species, and harvest dispersion.

Benchmark 3A

Maximum Present Net Value Including Assigned Values (36 CFR 219.12(e)(1)(iii)(B)) - Specifies the management level which will maximize the present net value of outputs having either an established market price or assigned monetary value with NDF and MRs. Benchmark 3A was reanalyzed for the FSEIS.

The purpose of FSEIS Benchmark 3A is to identify the maximum efficient level of production for timber and water augmentation in combination.

1. Objective Function - Maximize PNv for 15 decades.
2. Land Base - All nonwilderness lands.
3. Constraints:
 - a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
 - b. Harvest rotations are based on 95 percent of CMAI.
 - c. Ending inventory constraints.
 - d. MRs for old growth and harvest dispersion.

Benchmark 3B

Maximum Present Net Value Including Assigned Values without other multiple use MRs (Forest Service direction for nonsignificant timber producing Forest) - Specifies the management level which will maximize the present net value of outputs having either an established market price or assigned monetary value, with timber MRs, but without other multiple use MRs. Benchmark 3B was not reanalyzed for the FSEIS.

The purpose of Benchmark 3B is to identify the tradeoffs and opportunity costs of management requirements for visual quality, big game habitat, old growth for indicator species, and harvest dispersion.

1. Objective Function - Maximize PNv for 15 decades.
2. Land Base - All nonwilderness lands.
3. Constraints:
 - a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
 - b. Harvest rotations are based on 95 percent of CMAI.
 - c. Ending inventory constraints.
 - d. Dispersion constraint on spruce-fir to insure clearcuts are less than 5 acres in size to provide an adequate seed source and shading for natural regeneration.

Benchmark 4A

Maximum Timber Production (36 CFR 219.12(e)(1)(ii)) - Identifies the maximum capabilities of the Forest to provide timber subject to NDF and MRs. BM # 4A also identifies the maximum efficient production levels of water augmentation when timber is maximized. Benchmark 4A was reanalyzed in the FSEIS.

Benchmark 4A estimates the maximum level of timber volume which could be attained on the Forest subject to rotation-age restrictions, nondeclining yield, ending inventory, and MRs for other resources.

The purpose of benchmark 4A is to identify the upper limits of timber production on the GMUG NF.

1. Objective Functions - Maximize timber in the first decade; maximize timber for 15 decades; maximize PN_V for 15 decades. The runs were done consecutively with the latter two building on the first. The maximum PN_V run was subject to producing the volumes determined in the previous two objective functions and was used to ensure that the most cost efficient schedule of prescriptions was chosen.
2. Land Base - All nonwilderness lands on the Forest.
3. Constraints:
 - a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
 - b. Rotations based on 95 percent of CMAI.
 - c. Ending inventory constraint.
 - d. MRs for old growth and harvest dispersion.

Benchmark 4B

Maximum Timber Production (36 CFR 219.12(e)(1)(ii)) - Identifies the maximum capabilities of the Forest to provide timber subject to nondeclining flow but without other multiple use MRs. BM # 4B also identifies the maximum efficient production levels of livestock production, big game winter range habitat, and water augmentation when timber is maximized without other multiple use MRs. Benchmark 4B was not reanalyzed in the FSEIS.

Benchmark 4B estimates the maximum biological potential of the Forest for timber production under nondeclining flow (NDF), rotations at or above 95 percent culmination of mean annual increment (CMAI), and ending inventory constraints.

The purpose of benchmark 4B is to identify the effect other multiple use MRs have on annual and long-term timber harvest levels.

1. Objective Functions - Maximize timber in the first decade; maximize timber for 15 decades; maximize PN_V for 15 decades. The runs were done consecutively with the latter two building on the first. The maximum PN_V run was subject to producing the volumes determined under the previous objective functions and was used to ensure that the most cost efficient schedule of prescriptions was chosen.

2. Land Base - All nonwilderness lands on the Forest.

3. Constraints:

- a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
- b. Rotations based on 95 percent of culmination of mean annual increment (CMAI).
- c. Ending inventory constraints.
- d. Dispersion constraint on spruce-fir to insure clearcuts are less than 5 acres in size to ensure that an adequate seed source and shading are present for natural regeneration.

Benchmark 4B was not reanalyzed with the revised water and timber values because the revised values do not affect timber production potential.

Benchmark 9

Maximum Water Augmentation (36 CFR 219.12(e)(1)(ii)) - Identifies the maximum capabilities of the Forest to augment current water production from the forest. BM # 9 also identifies the maximum efficient production levels of timber production when water augmentation is maximized. Benchmark #9 was reanalyzed in the FSEIS.

1. Objective Functions - Maximize water augmentation for 15 decades; maximize PNV for 15 decades. The runs were done consecutively with the latter building on the first. The maximum PNV run was subject to producing the water augmentation level under the first objective function.
2. Land Base - All nonwilderness lands on the Forest.
3. Constraints:
 - a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
 - b. Rotations based on 95 percent of CMAI.
 - c. Ending inventory constraints.
 - d. MRs for old growth and harvest dispersion.

Benchmark 9 was supplemented between the AMS and the evaluation of alternatives to test the effect of the revised water yield coefficients.

Benchmark 10

Current Level (36 CFR 219.12(e)(2)) - Specifies the management most likely to be implemented in the future if current direction is followed. Benchmark 10 is the same as the "no action" alternative, Alternative 1A. Alternative 1A was reanalyzed in the FSEIS.

1. Objective Function - maximize PNV for 15 decades.
2. Land Base - All nonwilderness lands on the Forest.
3. Constraints:
 - a. Nondeclining flow (NDF) at or below the long-term sustained-yield (LTSY).
 - b. Rotations based on 95 percent of CMAI.
 - c. Ending inventory constraint.
 - d. MRs for old growth and harvest dispersion.
 - e. Demand cut-off points for timber.
 - f. Sawtimber harvests at 7000 MCF annually, aspen harvests at 875 MCF annually.
 - g. Spruce-fir sawtimber harvest ceiling of 5250 MCF annually, lodgepole sawtimber harvest floor of 1232 MCF annually, and ponderosa sawtimber harvest floor of 162 MCF annually.

Summary of Benchmarks 1-9

PNV and first decade outputs for the benchmarks are summarized below. A discussion of Benchmark #10, Current direction (Alternative 1A), can be found in Appendix B Sections VII and VIII. Benchmarks analyzed only in the DSEIS are compared only against other DSEIS benchmarks, and, likewise, FSEIS benchmarks are compared only against other FSEIS benchmarks.

Nondeclining Even-Flow (NDF) Policy

Current policy states that the ASQ of the Forest must not decline over time and the annual average volume offered for sale in any decade cannot exceed the long-term sustained-yield. To determine the potential effects to the Forest that the lack of an NDF policy would cause, a comparison was made between DSEIS Benchmark 3 and DSEIS Benchmark 3A. Both benchmarks contain constraints for MRs and allow stands to be harvested at economic maturity. DSEIS Benchmark 3 lacks the nondeclining even-flow constraint. Without NDF, the first decade ASQ increased 232 percent from 26.0 in Benchmark 3A to 60.4 MMCF/year in Benchmark 3. The total PNV increased only .24 percent in the absence of NDF. While nondeclining flow can greatly affect first decade timber harvesting, total PNV is essentially unaffected.

Other Multiple Use MRs

NFMA requires that certain resource objectives (MRs) be met in the Forest Plan. To determine the potential effects to the Forest without other multiple use MRs, a comparison was made between DSEIS Benchmark 3A and DSEIS Benchmark 3B to identify tradeoffs in efficiency, and a comparison was made between DSEIS Benchmark 4A and DSEIS Benchmark 4B to identify tradeoffs in biological timber production. All four DSEIS Benchmarks contain the timber MRs (see page B 73-74). Based on efficiency, the other multiple use MRs reduced PNV by .2% and the first decade timber harvest by 9.6% or 1.3 MMCF annually. Based on biological potential, the other multiple use MRs reduced the first decade timber harvest by 4.6% from 37.4 MMCF annually in Benchmark 4B to 35.8 MMCF annually in Benchmark 4A. MRs have little affect on either PNV or timber production.

Market vs Non Market Outputs

FSEIS Benchmark 2A indicates that no timber should be harvested, or put another way, no financially efficient timber stands exist on the Forest. FSEIS Benchmark #3A has an efficient harvest level of 25 MMBF annually in the first decade. The additional harvest is all spruce-fir shelterwood harvesting and it is economically efficient due only to water augmentation benefits.

Table B-VI-1

DSEIS BENCHMARK SUMMARY

(Values presented in parentheses are those from the original AMS benchmark analysis, and values not in parentheses are from the DSEIS analysis using revised POL and water values.)

DSEIS Benchmark	PNV MM 82 \$	Suited Timber Acres	Water MAFT	Timber MMCF
BM #1	2,656	0	0.0	0.0
BM #2A ⁺	146	1,187,253	21.3	16.6
BM #3	3,387	996,754	137.0	60.4
BM #3A	3,379 (2,364)	935,444 (864,904)	106.7 (71.1)	26.0 (13.3)
BM #3B	(2,368)	(881,991)	(71.1)	(14.5)
BM #4A	(2,338)	(1,249,155)	(26.7)	(35.8)
BM #4B	(2,340)	(1,308,660)	(25.2)	(37.4)
BM #9	3,359	1,143,264	80.0	30.7

⁺ Differences in PNV between BM #2A and Benchmark #1 are due to the lack of water benefit values in BM #2A.

FSEIS BENCHMARK SUMMARY

FSEIS Benchmark	FORPLAN PNV MM 82 \$	Suited Timber Acres	Water MAFT	Timber MMCF
BM #2A	0	0	0	0
BM #3A	6.9	672,749	9.3	5.6
BM #4A	-8.8	1,190,773	20.3	27.4
BM #9	-4.9	1,136,800	32.0	19.2

FEIS Benchmark analyses

A number of changes occurred between the Draft and Final SEIS which affect the benchmark analysis. Timber prices were increased due to increasing timber sale bid rates. Timber costs also increased significantly for a number of reasons: costs considered fixed costs in the DSEIS were considered to be variable costs in the FSEIS; the Forest estimated higher costs for managing timber on the Forest's higher-cost, lower-productivity timber lands; and in both road construction costs and the number of miles of road construction needed for a standard timber sale increased in the FSEIS.

Water augmentation was reduced with the elimination of the three size ranges of clearcuts in the DSEIS to one average clearcut size in the FSEIS. The DSEIS also calculated a higher rate of water augmentation for a five acre clearcut, but the FSEIS used only an average 20 acre clearcut size which has a lower water yield.

Only the FEIS benchmarks with all MRs (Benchmarks 1, 2A(ALT 1F), 3A, 4A, & 9 are referred to as the MR benchmarks) were used to develop the Forest's supply and efficiency decision space. Benchmarks without all MRs were not used because anticipated timber production levels are not high enough to warrant production outside of the MRs analyzed in FORPLAN. Table B-VI-2 summarizes the decision space determined by the benchmarks.

Benchmark 4A (maximize timber production) contains the highest number of suited timber acres among the MR benchmarks, while Benchmarks 1 and 2A (minimum level and maximize timber revenues) produce no timber. Without considering Benchmark 1, the suited acres among the MR benchmarks range from 0 acres in Benchmark 2A to 1,190,773 acres in Benchmark 4A.

Table B-VI-2

**DECISION SPACE
(Constrained by MRs)**

<u>OUTPUT/EFFECT (150 YR)</u>	<u>UNIT OF MEASURE</u>	<u>LOW</u>	<u>HIGH</u>
Suited Timber <u>(First Decade Average)</u>	Acres	0	1,190,773
Water Augmentation	M Ac Ft	0	32.02
Biological Potential for Timber Production	MMCF MMBF	0	27.44 116.77
Efficient Timber Production with all Benefits	MMCF MMBF	0	5.57 25.06
Efficient Timber Production with Market Benefits Only	MMCF	0	0

Benchmark 9 (maximize water augmentation) produces the most water augmentation in decade one. Without considering Benchmark 1, the decade one water augmentation ranges from 0 M Aft annually in Benchmark 2A to 32.02 M Aft in Benchmark 9.

Three benchmarks provide important information on the decision space for timber harvest levels, the biological capacity of the Forest to produce timber (Benchmark 4A), the efficient level of timber production when market and nonmarket benefits (timber and water) are considered (Benchmark 3A), and the efficient level of timber production when only market benefits (timber) are considered (Benchmark 2A). The Forest has a biological capacity to produce 27,440 MCF (116,770 MBF) annually in decade one. The efficient level of timber harvesting when market and nonmarket benefits are considered is 5,570 MCF (25,060 MBF) annually in decade one. The efficient level of timber harvesting when only market benefits are considered is 0 MCF annually in decade one. The difference between Benchmark 4A and 3A is the difference between managing for maximum timber production at any cost and managing to obtain the greatest value from the Forest's timber. The difference between Benchmark 3A and Benchmark 2A is largely due to the absence of water benefit values from Benchmark 2A.

Timber Demand Sensitivity Benchmarks

Timber Demand

Timber demand was determined in different ways for different products due to both the quality of data available and the nature of the different products. Demand was determined for conifer sawtimber, aspen sawtimber, conifer POL, and aspen POL. Later timber demand was aggregated into three different noninterchangeable components (NIC's) of sawtimber, conifer POL, and aspen POL.

By "timber demand" the analysis means expected future demand. This is determined in two different steps. First, current demand is determined. Second, short term projections into the future are made to estimate the level of timber harvesting during the next two decades. Several scenarios of future demand (for the next 20 years) from the Forest were developed. Scenario D-2 was selected as the Forest's best estimate of future demand and serves as a valuation cutoff point in the alternatives. The analytical processes, results of the analysis, and conclusions are presented below.

The timber demand analysis groups Forest industrial wood fiber products into four categories. Each category is based on an aggregation of species and products which are somewhat interchangeable. For example, 2X4's can be spruce, pine or fir and are interchangeable on the national market as long as certain grade specifications are met. (See weekly "Spot Lumber Prices" Monday Wall Street Journal and WWSA white wood index prices to support interchangeability of conifer species.) The categories represent different local markets and have different demands.

-Non-waferwood Conifer and Aspen Products Other Than Logs (POL): This comprises conifer and aspen sold as POL for posts and poles, commercial firewood, mine props and pilings, and miscellaneous products. Minimum utilization standards are five inches diameter at breast height (d.b.h.); four inches top merchantable diameter; 6.5 foot length.

-Conifer Sawtimber: This comprises sawtimber from Engelmann spruce, Subalpine fir, Lodgepole pine, Ponderosa pine, Douglas fir, and other conifer species. Minimum utilization standards are seven inches diameter at breast height (d.b.h.); six inches top merchantable diameter; eight foot length; at least 33.33 percent sound.

-Waferwood: This comprises aspen and conifer POL used for waferwood manufactured by Louisiana Pacific Corporation. Minimum utilization standards are five inches diameter at breast height (d.b.h.); four inches top merchantable diameter; 6.5 foot length.

-Aspen Sawtimber: This comprises aspen sold as sawtimber. Minimum utilization standards are seven inches diameter at breast height (d.b.h.); six inches top merchantable diameter; eight foot length; at least 50 percent sound.

Assumptions/Requirements

The following assumptions are common to all alternative approaches to estimating current and future timber demand trends (both price/quantity demand and consumptive use):

-Demand estimates represent the Forest's market share.

-Past timber harvest levels are good predictors of current and near future (next 20 years) harvest levels as long as major changes in the local market do not occur.

-The harvest data from the Forest's annual cut and sold reports transaction evidence data is the best data available.

-Sufficient Forest transaction records do not exist to adequately identify waferwood industry demand.

-All volume estimates are based on Forest Service standard cruising methods.

Approaches Deleted from Further Analysis

-Demand trend analysis adjusting Rocky Mountain Region demand equations down to the Forest level.

-Demand trend analysis adjusting Rocky Mountain Region elasticity estimates down to the Forest level.

Both were eliminated because of an inability to correlate the Resources Planning Act (RPA) National/Regional model with Forest level data.

Approaches Considered in Detail

Three different approaches were analyzed in detail:

- 1) The first approach was stepwise regression trend analysis using local data to identify price/quantity demand

The stepwise approach modeled sawtimber harvest as a function of local factors affecting the costs of getting National Forest sawlogs to the mill. Additionally, an external market factor - Western Wood Products Association White Wood Index - was tested to see if it could help explain timber harvest trends.

- 2) The second approach identified current demand for the four product categories as a function of actual harvested volumes. The harvest levels were developed without using a price/quantity relationship. The harvest volume is not a function of the price of the stumpage, but represents a simple harvest trend from the Forest's annual timber cut and sold reports.

- 3) The third approach also used a simple harvest trend approach, but data was obtained by surveying local loggers and mills on their production levels, on how much timber came from the Forest, and on what their plans were for production in 1991. The study was conducted by the Colorado State Forest Service (CSFS) at the request of the Forest.

Adjustments were made to the figures in the CSFS Demand Study to avoid double counting volumes reported by independent loggers and the mills. Adjustments were also made to be consistent with Forest conversion factors found in FSM 2431.42--1, R-2 Supp 326.

The first approach uses a stepwise regression price/quantity demand analysis to attempt to develop a downward sloping demand curve considering price/quantity relationships as a function of volumes harvested and volumes sold. No statistically significant relationships between price and quantity could be found.

The second approach uses Forest cut and sold reports to identify current harvest trends using a number of different time periods.

The third approach uses CSFS Demand Study data on capacity and volumes processed for each mill in the Forest's planning area and is based on what timber operators said they processed. A copy of the study (CSFS Demand Study) is available at Forest Headquarters, Delta, Colorado or at the Colorado State Forest Service Office, Grand Junction, Colorado.

The CSFS Demand Study relies on the following assumptions:

- Operators knew how much material they had handled and reported it accurately.
- Operators knew what proportion of the material they handled came off the Grand Mesa, Uncompahgre, & Gunnison National Forests.
- The current proportion of timber coming off the Forest will remain constant. Each operator will continue to purchase the same percentages from the Forest and other lands.

Table B-VI-3 summarizes the estimates obtained by the second and third timber demand analysis approaches. A total of six product categories were analyzed, four by transaction evidence and two through the CSFS Demand Study. Board foot figures are depicted in parentheses.

TABLE B-VI-3

Current Demand Trend Estimates
(Thousand Cubic Feet - MCF)

Product Categories	<u>Transaction Evidence Cut and Sold Report</u>				<u>CSFS Demand Study</u>
	<u>Approach</u>				<u>Approach</u>
	13 Yr. Avg.	7 Yr. Avg.	5 Yr. Avg.	Recent Year Average	1986
^a Conifer					
Sawtimber	3,370 (15,170)	3,680 (16,550)	3,917 (17,625)	4,683 (21,073) (1985-1987)	N/A
^a Aspen					
Sawtimber	250 (1,140)	320 (1,440)	363 (1,633)	[363] [(1,633)]	N/A
^b Conifer					
POL	570 (2,270)	710 (2,820)	[710] [(2,820)]	[710] [(2,820)]	N/A
^b Aspen					
POL	[255] [(1020)]	[255] [(1020)]	[255] [(1,020)]	255 (1,020) (1984-1986)	N/A
Waferwood	N/A	N/A	N/A	N/A	8,000 (32,000)
^a Dimension products	N/A	N/A	N/A	N/A	^d 10,497 (47,238)
TOTAL	^c 4,445	^c 4,965	^c 5,245	^c 6,011	^e 18,479

(19,600) (21,830) (23,098) (26,546) (79,238)

Index to Table B-VI-3.

- a --Assumes 4.5 MMBF per 1.0 MMCF. Conversions may not be exact due to rounding.
- b --Assumes 4.0 MMBF per 1.0 MMCF. Conversions may not be exact due to rounding.
- c --bracketed number represents a location in a column where a particular value was not calculated. The value in the brackets represents the best estimate of current demand for a particular product. This value was added to the column to aid in comparing column totals.
- d --Assumes 4.5 MBF per 1.0 MCF. Figure recalculated from CSFS Demand Study estimate which used conversion factor of 5.00 MBF per 1.0 MCF.
- e --Does not include personal use fuelwood volumes
- * --Actually represents supply as the amount the Forest put up for sale was constrained by legal challenges to the Forest's aspen management program.

Estimates of current demand for the Forest's woodfiber range between 4,445 MCF and 18,497 MCF (from Table B-VI-3). The low end represents the long term 1974 to 1986 average, while the upper end represents what the local operators and mills have said they harvested from the Forest in 1986 (CSFS Demand Study). The thirteen-year average and the CSFS Demand Study estimates for dimension products reviewed in Table B-VI-3 were eliminated from further consideration.

The thirteen-year average was rejected since the local wood fiber market has been gradually increasing over the last fifteen years and has recently increased substantially. Estimates of current demand would be substantially underestimated by the thirteen-year average. The CSFS Demand Study estimates for dimension products is too high to be a realistic number when compared to the Forest's transaction records. The reason the CSFS Demand Study estimates are high is due to the use of lumber tally measurements at the mill versus the Scribner Decimal C measurement system the Forest uses plus a lack of transaction records as a source of data in the CSFS study.

The Forest used the CSFS Demand Study and professional judgement to determine current and future demand for aspen and conifer waferwood POL. The CSFS Demand Study was used to determine the total current and future demand for waferwood POL. Professional judgement was used to determine the proportion of aspen to conifer POL demand, and the percentage of total demand, which is demand for the Forest's woodfiber. The demand for waferwood POL has changed dramatically from 0 to 8 MMCF since new industry arrived in the planning area in 1985. Unlike other timber demand estimates, the 8 MMCF estimate is for both Forest and nonForest woodfiber. Most of the waferwood now being processed by new industry has come from private land. Industry contends that the private land supply is now exhausted (Fall 1987). If this is true, most of the total local area waferwood supply will have to come from the Forest if the waferwood industry is to remain in the local area.

Recent Forest aspen 'sale' transaction records indicate the new industry has purchased all of the available aspen volume offered, in addition to purchasing aspen from adjoining National Forests, and from private, state, and other

public lands like the BLM. The Forest believes a reasonable estimate of current demand for waferwood from the Forest is 90 percent of the total demand or 7.2 million cubic feet. (28.8 MMBF).

Sawtimber harvest volumes have increased substantially over the last three years (1985-1987) due to Blue Mesa Forest Products Corporation. The last three years is a better estimate of conifer sawtimber demand than the 5 year, the 7 year or the 13 year averages because of the increase in existing mill capacity and production beginning in 1985. Therefore, the Forest has selected the current conifer sawtimber demand to be 4,683 MCF per year.

The demand for other non-waferwood conifer POL is small. Non-waferwood conifer POL products include posts, poles, and mine props. The demand is strictly local and has not significantly changed recently. The seven year average will provide the best estimate of non-waferwood conifer POL demand. The Forest originally assumed that the current non-waferwood conifer POL Demand is 710 MCF annually. Although historic records estimate non-waferwood conifer POL demand to be 710 MCF annually, the management team determined the level was closer to 250 MCF.

The demand for aspen sawtimber is small when compared to demand for other products. A few small mills in the North Fork valley produce aspen dimension products. The demand for aspen sawtimber has changed only slightly over the last five years. Therefore, the Forest identified the current aspen sawtimber demand as 363 MCF (1,633 MBF) per year. While the management team felt that the volume was correct, they determined that not all of the 363 MCF should be sawtimber. Annually, approximately 300 MBF (75 MCF) is sold as pure aspen sales on the Paonia District. The management team felt the volume should be sold as POL to obtain a better price and to be consistent with the rest of the aspen sales program. The I.D. examined the remaining (296 MCF) aspen sawtimber demand and determined it is not really demanded because it is usually an unwanted portion of conifer timber sales which operators are required to remove from the sale area. Therefore the 296 MCF was eliminated from the demand estimates.

The aspen non-waferwood POL estimates from the Forest's Cut & Sold reports was not used in estimating demand because harvest records previous to 1984 do not exist and all aspen production after 1984 is assumed to be for waferwood.

Table B-VI-4 displays the estimates of current annual wood fiber demand on the Grand Mesa, Uncompahgre, and Gunnison National Forests. Board foot volumes are noted in parentheses.

TABLE B-VI-4.

Current Annual Wood Fiber
Demand By Product Category
(Thousand Cubic Feet - MCF)

<u>Product Categories</u>	<u>Volume</u>	
Sawtimber	4,683	(21,000)
Aspen POL (90-100% Aspen)	7,200	(28,800)
Other POL *	325	(1,300)
Total	12,208	(51,100)

* Post, Poles, Mine Props etc.

Based upon the previous analysis and discussion, the total current demand for the Forest's industrial woodfiber is 12.2 million cubic feet or 51.1 million board feet annually.

Future Timber Demand

A number of timber demand scenarios were developed to identify a range of possible future demand levels. Demand Scenario D-2 was found to be the most likely to occur in the future and was used to set timber demand cut-off points in the alternative analyses.

Generally the scenarios considered a range of future possible demands for each of the product categories. The products allowed to change the most in the demand scenarios are conifer sawtimber and waferwood POL. Conifer sawtimber and waferwood POL were modeled at a high point, a low point, and one or two points in between.

Aspen sawtimber was analyzed at a low level and a current level. A high level was not analyzed because of a lack of current or potential markets which would significantly increase aspen sawtimber demand.

Other conifer POL demand was assumed to be constant.

For sawtimber the volumes harvested over the last 13 years were used for the low end of timber demand. Midpoint estimates were based on current harvest volumes likely for the next one to five years. High estimates were based on mill capacity obtained from the CSFS Demand Study. Analysis of the CSFS Demand Study data indicates an 18.5% increase in sawlog demand will occur by 1991.

Possible future waferwood POL demand levels are listed below. Since there is a very limited history of Forest and private land demand and supply relationships for waferwood POL, a broader range of demand levels was selected for the waferwood POL product category than for conifer sawtimber.

- No waferwood POL demand
- 50 % of the total area waferwood POL demand
- 75 % of the total area waferwood POL demand
- 90 % of the total area waferwood POL demand
- 100 % of the total area waferwood POL demand

The demand scenarios present all waferwood estimates with a 90% aspen and 10% conifer mix. Analysis of questionnaires from the CSFS Demand Study indicates waferwood demand will increase 28% by 1991.

Using the key factors related to harvest levels, species substitution, and existing capacity, the Forest developed six possible scenarios: A, B, C, D, D-2, and E, which represent a reasonable range of future demand scenarios and cover the major differences in demand estimates for each individual product. The small changes in other conifer POL and aspen sawtimber made by the management team and explained on the previous page were made after the timber demand sensitivity analysis was complete and do not appear in the demand scenarios.

Scenario A

Sawtimber demand decreases to the thirteen-year average harvest levels. The existing waferwood industry leaves the Forest's market area.

Table B-VI-5 displays future demand predictions by product category for the near future by decade for Scenario A.

TABLE B-VI-5.

Scenario A		
Future Average Annual Demand By Decade		
(Thousand cubic feet per year - MCF)		
<u>Product Category</u>	<u>First Decade</u> <u>1988 - 1997</u>	<u>Second Decade</u> <u>1998 - 2007</u>
Conifer POL	710 (2,840)	710 (2,840)
Aspen POL	260 (1,040)	260 (1,040)
Conifer Sawtimber	3,370 (15,165)	3,370 (15,165)
Aspen Sawtimber	250 (1,125)	250 (1,125)
Total	4,590 (20,170)	4,590 (20,170)

Scenario B

Sawtimber demand remains at current levels, and the demand for waferwood POL from the GMUG turns out to be 50% of the total area demand. Demand for waferwood increases in 1991 by 28% but the Forest's demand remains at 50% of the total.

Table B-VI-6 displays future demand predictions by product category for the near future by decade for Scenario B.

TABLE B-VI-6.

Scenario B		
Future Average Annual Demand By Decade		
(Thousand cubic feet per year - MCF)		
<u>Product Category</u>	<u>First Decade</u> <u>1988 - 1997</u>	<u>Second Decade</u> <u>1998 - 2007</u>
Conifer POL	710 (2,840)	710 (2,840)
Waferwood POL		
Aspen	4,306 (17,224)	4,608 (18,422)
Conifer	478 (1,912)	512 (2,048)
Conifer Sawtimber	4,683 (21,074)	4,683 (21,074)
Aspen Sawtimber	363 (1,664)	363 (1,664)
<u>Total</u>	<u>10,540 (44,714)</u>	<u>10,876 (46,058)</u>

Scenario C

Conifer sawtimber demand starts at current levels and increases by 18.5% in 1991. The Forest's share of total waferwood demand turns out to be 75% of the total. Demand for waferwood increases in 1991 by 28% but the Forest's demand remains at 75% of the total.

Table B-VI-7 displays future demand predictions by product category for the near future by decade for Scenario C.

TABLE B-VI-7.

Scenario C		
Future Average Annual Demand By Decade		
(Thousand cubic feet per year - MCF)		
<u>Product Category</u>	<u>First Decade</u> <u>1988 - 1997</u>	<u>Second Decade</u> <u>1998 - 2007</u>
Conifer POL	710 (2,840)	710 (2,840)
Waferwood POL		
Aspen	6,458 (25,832)	6,912 (27,648)
Conifer	718 (2,872)	768 (3,072)
Conifer Sawtimber	5,289 (23,800)	5,549 (24,970)
Aspen Sawtimber	363 (1,634)	363 (1,634)
<u>Total</u>	<u>13,538 (56,978)</u>	<u>14,302 (60,164)</u>

Scenario D

Conifer sawtimber demand starts at current levels and increases by 18.5% in 1991. The Forest's share of total waferwood demand turns out to be 90% of the total. Demand for waferwood increases in 1991 by 28% but the Forest's demand remains at 90% of the total.

Table B-VI-8 displays future demand predictions by product category for the near future by decade for Scenario D.

TABLE B-VI-8.

Scenario D		
Future Average Annual Demand By Decade		
(Thousand cubic feet per year - MCF)		
Product Category	First Decade 1988 - 1997	Second Decade 1998 - 2007
Conifer POL	710 (2,840)	710 (2,840)
Waferwood POL		
Aspen	7,750 (31,000)	8,294 (33,176)
Conifer	861 (3,444)	922 (3,688)
Conifer Sawtimber	5,289 (23,800)	5,549 (24,970)
Aspen Sawtimber	363 (1,634)	363 (1,634)
Total	14,973 (62,718)	15,838 (66,308)

Scenario D-2 - Demand Scenario D-2 was identified by the Forest as the most likely future demand for the Forest and was used as timber demand cutoff points in the alternative analysis.

Conifer sawtimber demand increases from 4,683 MCF/year to 6,578 based on an increased utilization of existing in-place mill capacity. The Forest's share of total waferwood demand turns out to be 90% of the total. Demand for waferwood increases in 1991 by 28% but the Forest's demand remains at 90% of the total.

Table B-VI-9 displays future demand predictions by product category for the near future by decade for Scenario D-2.

TABLE B-VI-9.

Scenario D-2		
Future Average Annual Demand By Decade		
(Thousand cubic feet - MCF)		
(Thousand board feet - MBF)		
Product Category	First Decade 1988 - 1997	Second Decade 1998 - 2007
Conifer POL	250* (1,000)	250 (1,000)
Waferwood POL		
Aspen+	7,750 (31,000)	8,294 (33,176)
Conifer	861 (3,444)	922 (3,688)
Conifer Sawtimber	6,578 (29,601)	6,578 (29,601)
Total	15,439 (65,045)	16,044 (67,465)

* After the DSEIS analysis was completed, the management team determined that the demand for conifer POL was actually 250 MCF (1000 MBF). The amount reflects demand for non-waferwood conifer POL sales. The analysis was not redone for the small change.

+ After the DSEIS analysis was completed, the management team examined the 363 MCF aspen sawtimber estimate and determined that 300 MBF of aspen sawtimber should actually be sold as POL. The aspen sawtimber demand was then reduced to 296 MCF and 75 MCF was added to POL demand as non-waferwood

aspen POL. After the FSEIS analysis, the I.D. team determined that the entire 363 original MCF would be absorbed into the aspen waferwood and aspen sawtimber demand estimates without changing those estimates. The analysis was not redone for this small change.

Scenario E

Conifer sawtimber demand increases to mill capacity; the Forest maintains its current share of the new demand level; and the conifer sawtimber industry continues to grow at an 18.5% rate by 1991. The Forest's share of total waferwood demand turns out to be 100% of the total. Demand for waferwood increases in 1991 by 28%, but the Forest's demand remains at 100% of the total.

Table B-VI-10 displays future demand predictions by product category for the near future by decade for this scenario.

TABLE B-VI-10.

Scenario E		
Future Average Annual Demand By Decade		
(Thousand cubic feet per year - MCF)		
<u>Product Category</u>	<u>First Decade</u> <u>1988 - 1997</u>	<u>Second Decade</u> <u>1998 - 2007</u>
Conifer POL	710 (2,840)	710 (2,840)
Waferwood POL		
Aspen	8,611 (34,444)	9,216 (36,864)
Conifer	957 (3,828)	1,024 (4,096)
Conifer Sawtimber	13,222 (59,499)	13,890 (62,505)
Aspen Sawtimber	363 (1,634)	363 (1,634)
<u>Total</u>	<u>23,863 (102,245)</u>	<u>25,203 (107,939)</u>

Timber Demand Sensitivity

The purpose of the timber demand sensitivity analysis is to compare the efficient level of timber production with changing timber demands. The analysis can be completed with the demand scenarios above; FEIS benchmark 3A, maximize PNW; and the stage II timber efficiency analysis. Benchmark 3A indicates that spruce-fir is the only economically efficient timber species on the Forest in decade one and the efficient decade 1 production level is 5,570 MCF (25,065 MBF) annually. The stage II efficiency analysis indicates that only spruce-fir less than two miles from a road is economically efficient over the entire 150 year planning horizon. The comparison indicates that the efficient level of aspen sawtimber, conifer POL, and waferwood POL production under all demand scenarios would be zero. Spruce-fir sawtimber production is the only species in question. Demand scenarios D-2 and E both exceed the efficient level of production, and demand scenarios A, B, C, and D produce less than the efficient level of production.

Timber Demand Update

It is now March 1991 and the timber demand analysis is somewhat outdated as current sawtimber demand is now approaching estimated future demand. Sawtimber

harvest levels for 1989 through 1990 were 25.0 MMBF, 27.1 MMBF and 30.1 MMBF respectively. The average for 1989 through 1990 is 27.4 MMBF compared to the estimated future demand of 29.6 MMBF. The 1990 sawtimber harvest can be said to equal the estimated future demand.

Water Demand

Water production demand was analyzed from National Forest lands for downstream users. No distinction was made between water users adjacent to the Forest and out-of-state water users. Water production was measured in acre-feet.

The Water Resources Planning Act of 1965 directed the U.S. Water Resources Council to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessment to determine the adequacy of these resources to meet present and future water requirements. The analysis used the Second National Assessment, related specifically to the Upper Colorado Region, in determining the future demand estimates for water in the Forest's planning area.

The following discussion is excerpted from the report titled "The Nation's Water Resources 1975 - 2000"; Volume 4: Upper Colorado Region; Second National Water Assessment by the U.S. Water Resources Council. Page 14 of the report states: "Total consumption will increase 32 percent in the next 25 years. Two important water uses in the Upper Colorado Region that deplete streamflow are exports and evaporation from reservoirs."

Page 15 of the report continues with: "Total Upper Colorado Region commitments including intraregion withdrawals, reservoir evaporation, exports to adjacent regions in Arizona, Colorado, New Mexico, Utah, and Wyoming, and deliveries to the Lower Colorado now exceed the 'virgin flow' at the outflow point of the region....If the states are to develop natural resources at the SRF (State/Regional Futures) rates and according to other expressed aspirations, severe water shortages will develop in a time frame that directly affects planning and development decisions being made today."

The report concludes, page 19, that: "The water supply in the Upper Colorado Region is not sufficient to meet projected needs, adequate instream flows, and the terms of the Colorado River Compact." On page 23, "The Continental transfer of water to large growing population centers outside the region in eastern Colorado, western Utah, Wyoming, and New Mexico will create conflicts with projected in-basin (in-region) users over an insufficient water supply."

A current proposal by Aurora, Colorado would divert up to a maximum amount of 108,500 acre-feet annually from the upper Gunnison River to the Colorado front range; this exceeds the water augmentation capability of the Forest (See Benchmark 9).

The Forest concludes that there is more demand for water than the Forest could ever produce by harvesting timber. As much as can be produced will be used by society somewhere in the western United States.

Conclusions From The Analysis Of The Management Situation

Possibilities For Resolving Issues, Concerns, & Opportunities

The potential supply of conifer sawtimber (63.2 MMBF) on the Forest exceeds the expected future demand. The potential supply of aspen POL (31.6 MMBF) is slightly more than demand in decade 1. The potential to supply conifer sawtimber and aspen POL while harvesting only the Forest's best timber lands is 21 MMBF and 15 MMBF respectively (See Section VIII Alternative 1G).

At current average prices, the Forest does not have financially efficient timber lands. Current average prices would have to double to more than triple for the Forest to break even on timber sales.

Increases in timber prices can substantially improve the financial efficiency of the Forest's timber program (See FSEIS Chapters II & III).

At current average prices only spruce-fir less than two miles from a road is economically efficient.

Noncommercial treatments are not effective means of producing the benefits claimed in the original Forest Plan (See FSEIS Page II-9). In addition, the Forest believes its original claims of the other resource benefits achieved by commercial timber sales were overstated. The analysis shows the priced-other-resource-benefits resulting from commercial timber sales are limited to water augmentation and minor forage increases for big game and domestic livestock.

Identification Of The Need To Establish A Change In Direction

The current Original Forest Plan allows for commercial harvesting approximately 310 acres of aspen annually from suited timber lands, which may not be enough to maintain local dependent industry and the 353 local jobs and \$5,900,000 in local employee income. The Forest can increase the level of production while still maintaining other multiple uses.

SECTION VII - FORMULATION OF ALTERNATIVES

Introduction

Section VII describes the process used by the Forest to construct management alternatives. The alternatives of the Final Supplemental Environmental Impact Statement (FSEIS) supplement the timber portion of the original 1983 FEIS & Forest Plan Preferred alternative; other portions of the 1983 FEIS & Forest Plan will not be changed. Constraints which were common to all alternatives are explained and the rationale for decisions is documented. Finally, the purpose, criteria, assumptions, and unique constraints for each alternative are presented in detail.

Requirements For Development of Alternatives

Each alternative is a mix of management strategies applied to specific areas on the Forest in order to achieve the desired management goals and objectives. The Interdisciplinary Team (ID Team) formulated a broad range of reasonable alternatives according to NEPA procedures. The primary goal in formulating alternatives, other than complying with NEPA procedures, is to provide an adequate basis for identifying the timber production alternative which comes nearest to maximizing net public benefits, consistent with the resource integration and management requirements of CFR 219.13 through 219.27. Alternatives were developed according to the following NFMA 36 CFR 219.12(f) requirements:

1. Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect, to the extent practicable, the full range of timber resource uses and values which could be produced from the Forest. Alternatives shall represent a range of resource outputs and expenditure levels.
2. Alternatives shall be formulated to facilitate analysis of opportunity costs, resource use, and environmental tradeoffs among alternatives and between benchmarks and alternatives.
3. Alternatives shall be formulated to facilitate evaluation of the effects on present net value, benefits, and costs of achieving various goals and outputs not assigned monetary values.
4. Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process.
5. At least one alternative shall be developed which responds to and incorporates the RPA Program.
6. At least one alternative shall reflect the current program (direction) provided by the Forest, and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures, the alternative shall be deemed the "no action" alternative.

7. Each alternative shall represent, to the extent practicable, the most cost efficient combination of management prescriptions examined to meet the objectives established in the alternative.
8. Each alternative shall state the conditions and uses resulting from the long-range application of the alternative; the goods and services to be produced; the timing and flow of the resource outputs together with associated costs and benefits; resource management standards and guidelines; and the purpose of the management direction proposed.

Overview of Alternative Development Process

The formulation of alternatives (planning step five) was based upon information gathered during the first four steps of the planning process:

1. Identification of issues, concerns, and opportunities (ICOs).
2. Development of planning criteria.
3. Resource inventories and data collection.
4. Analysis of the Management Situation.

Information gathered during the early steps guided the formulation of a range of alternatives. Each major issue, concern, and opportunity was addressed in one or more of the alternatives. The need to satisfy legal and regulatory mandates was also a factor in the development of the alternatives. Finally, cost efficiency was a consideration throughout the process. The following discussion is a summary of the planning actions involved in the formulation and analysis of the alternatives. The focus will be upon the roles which the ICOs and the benchmarks played in the alternative development process.

The mixture of alternatives was designed to address the different ways of managing the Forest's timber program. The physical, biological, and legal limits of Forest management are reflected in the issues, concerns, and opportunities identified at the outset and served to guide the overall Forest planning process.

The Analysis of the Management Situation (AMS) was a key step leading up to the development and evaluation of alternatives. The AMS provided a picture of the Forest's ability to supply goods and services (refer to Appendix B, Section VI for a more detailed discussion of the AMS). The AMS determined:

- The minimum and maximum capability of the Forest to produce timber-related goods and services.
- Demand and consumption estimates for timber and water augmentation.
- Possibilities for resolving the public ICOs.
- Identification of the needs to establish or change direction.

Once the benchmark analyses were completed, the ID Team proceeded to formulate alternatives. Initially, the ID Team analyzed the various parts of each issue.

The resource supply potentials and projected demands were compared with respect to resolving the identified planning ICOs. The ID Team also considered national and regional Forest Service direction and other information in building alternatives.

Alternative themes or goals were established in order to provide a broad range of options regarding the future management of the Forest. Based on the analysis scenarios, descriptions were written to define the resource management intent for each possible alternative.

In the original Forest Plan EIS, each alternative was made up of different mixes of management area prescriptions. The Forest Plan Amendment Process uses a single set of management area prescriptions for all alternatives. While the Forest proposes to change some of the management area boundaries and associated standards and guidelines, the changes apply to all alternatives. During the Forest Plan Amendment Process the ID team discovered that the acreages published in the Forest Plan were in error for some of the management areas. The acres proposed for the Forest Plan Amendment can be found in Chapter II of the FSEIS Table II-5.

Finally, each alternative was analyzed using the FORPLAN model. The model was allowed to optimize the choice of timber and nontimber prescriptions subject to the objective of maximizing PNV and the resource management constraints. The resource management constraints were designed into the model to provide for the spatial and temporal feasibility of management area assignments and harvest scheduling choices. Each alternative was also designed to be environmentally acceptable. Once the model arrived at a feasible solution by satisfying all of the constraints, the model searched for the set of prescriptions and timing choices which permitted an optimal solution according to the specified objective of maximum PNV. Some alternatives, such as Alternative 1C, allowed FORPLAN a high degree of freedom in prescription selection; others, such as Alternative 1A, tended to limit available FORPLAN prescriptions. The constraints used are explained in the following sections. With varying objectives each alternative produced a different combination of outputs.

Cost Efficiency

Concerns for cost efficiency exist in two major areas: in the development and use of constraints, and in the final FORPLAN solution for each alternative analyzed. To ensure that the set of constraints used to model an alternative was the most cost efficient, several steps were taken. First, each major objective within the alternatives was reviewed to formulate a meaningful constraint to simulate the management needed to achieve that objective. Objectives not modeled are achieved through the standards and guidelines specific to the corresponding management strategy.

Constraints were developed to allow as many possibilities in FORPLAN as possible, in order to allow the FORPLAN analysis to select the most efficient method of achieving the constraint.

The management activity costs used in the alternative analysis were based on the most recent data available from both the Ranger Districts and specialists within the Supervisor's Office. Costs were modeled on the most practical site-specific level within FORPLAN. All of the above steps combined to ensure that both the

constraints and the final FORPLAN alternative solutions were the most cost efficient attainable, given the assumptions used.

Common Constraints

Many of the constraints used within the FORPLAN model to help formulate and characterize the different alternatives were the same across all alternatives. The constraints were necessary in order to meet either management requirements, existing laws and policies, or prescription objectives; to ensure technical implementability; or to represent other resource output levels which did not change by alternative. Common alternative constraints are presented below in terms of their purpose and rationale. Unique alternative constraints are discussed in the next section on the development of alternatives.

The tradeoffs for each constraint or constraint-set were analyzed under the context of the alternative in which they were used. The base model formulation used for the analysis was Alternative 1C which uses timber demand scenario D-2 (see page B-80) for timber demand cut-off points, and maximizes PNV subject to nondeclining timber yield, ending inventory requirements, dispersion, and rotations at 95 percent CMAI. The results of the tradeoff analysis are presented in Chapter 2 of the FSEIS.

Nondeclining Yield & Sustained-Yield Link

The Forest is currently managing timber based on a policy of nondeclining even-flow. This constraint in the FORPLAN model is designed to ensure that the harvest levels in each decade are equal to or greater than the harvest in the previous decade. The harvest level in the last decade of the planning horizon must be less than or equal to the long run sustained-yield calculated for the alternative.

Rationale

Without the constraints, harvest levels could rise and fall erratically thus allowing industry to expand greatly in one decade only to be put out of business the next.

Tradeoffs

By imposing the nondeclining flow constraints as opposed to permitting a departure harvest schedule, the flexibility to harvest timber in such a way as to maximize PNV in the Benchmarks is reduced. All alternatives propose harvesting below the Forest's capacity and the effect of nondeclining flow and the sustained-yield link on the alternatives is not significant.

Ending Inventory Constraint

This constraint attempts to ensure that the total inventory volume left at the conclusion of the harvest scheduling planning horizon (150 years) is sufficient to maintain the harvest pattern established for the given alternative.

Rationale

In the absence of the constraint, the FORPLAN model would have no incentive to leave enough inventory at the end of 150 years to sustain the harvest levels into perpetuity.

Tradeoff

Since some volume which is available for harvest at the end of the harvest scheduling horizon must be reserved for future decades, timber-related outputs and benefits will be reduced in the benchmarks. All alternatives propose harvesting timber below both demand and the Forest's capability; the effect of the ending inventory constraint will not be significant.

Rotations at 95 Percent CMAI

This constraint is intended to control the minimum age at which a timber stand can be regenerated. The minimum is determined by calculating the age at which the stand achieves 95 percent culmination of mean annual increment of timber volume growth. The constraint is applied through the individual prescription data as entered in the FORPLAN model.

Rationale

The constraint is based on Forest Service policy which generally restricts timber regeneration harvests to rotations at 95 percent CMAI or greater.

Tradeoff

The 95 percent CMAI limitation on rotation age is based on biological criteria as opposed to economic criteria and serves as the earliest age at which a timber stand could be harvested. The CMAI constraint decreases the maximum allowable sale quantity and PNV.

Harvest Dispersion Constraint

This constraint attempts to control the timber harvest scheduling within contiguous stands of timber over the planning horizon to ensure compliance with Regulation (36 CFR 219.27), to ensure compliance with the Forest's Standards and Guidelines, and to allow for spatial problems encountered when laying timber sales out on the ground. 36 CFR 219.2 requires that even-aged regeneration harvest units be less than 40 acres in size and that the openings be separated by logical harvest units. The dispersion constraints for the maximum number of acres allowed for harvest in a ten-year period have been calculated using the following method:

From the ten-year timber sale schedule, the number of net acres for each species was totaled. To obtain the dispersion constraint, these numbers were then

divided by the total number of appropriate acres for each species. The results are displayed below.

SPECIES	TOTAL OF NET ACRES	TOTAL OF APPROPRIATE ACRES	DISPERSION CONSTRAINT
Aspen	= 13700 /	163918 =	.0836
ES-AF-DF	= 44435 /	216717 =	.2050
Lodgepole Pine	= 11173 /	89366 =	.1250
Ponderosa Pine	= 7550 /	74730 =	.1010

Rationale

If the constraints were not used, the FORPLAN model would schedule more timber than is legal or realistic during a decade in order to best meet its objective function of maximizing present net value.

Tradeoff

Dispersion constraints restrict FORPLAN's freedom to schedule timber harvests and, at least on paper, reduce PNV and timber harvest volume. In reality, the dispersion constraints keep the model realistic and prevent the model from overharvesting the Forest.

Old Growth Constraint

This constraint requires at least 5% of all timber types be retained as old growth.

Rationale

The old growth constraint was taken from the Forest Plan Standards and Guidelines (See Amended Forest Plan page III-). The constraint helps to maintain a diversity of age classes and conditions on the Forest's timbered lands.

Tradeoff

The constraint reduces the number of acres of suited timber land in the alternatives.

Even Flow of Timber Products

In addition to NDF of all timber, alternatives were constrained to have a nondeclining flow of conifer sawtimber, aspen sawtimber, aspen POL, all POL, and nondeclining flow between FORPLAN level 2 Appropriate timber lands and other tentatively suited timber lands.

Rationale

Conifer sawtimber, aspen sawtimber, and POL are different industries in the local economy, and each needs some assurance of a sustained timber supply level. The local waferwood industry, which uses POL, needs to be able to anticipate the proportion of aspen/conifer POL available to it. Nondeclining

flow constraints on the appropriateness criteria (See Appendix B page 88) keep the model from high-grading and overharvesting the appropriate timber lands during the first few decades at the expense of harvesting other lands in later decades.

Tradeoff

The constraint results in a decrease in PNW. If even-flow of products did not occur, fluctuations could force otherwise viable firms out of business. If even-flow from appropriate and other timber lands did not exist, the better lands would be overharvested in the model. Both constraints keep the model realistic and enable it to meet Forest Standards and Guidelines.

Demand Cut Off Constraints

All alternatives were constrained to value outputs only up to the level of expected future demand (See Appendix B page B-80.)

Rationale

Outputs for which there is no demand have no value.

Tradeoff

The constraint reduces efficient production levels in the FORPLAN analysis but keeps the model realistic.

Development of Alternatives

The following discussion pertains to the development of the six alternatives displayed in the FSEIS and the two DSEIS alternatives not analyzed in detail. The focus is on describing the purpose of each alternative and identifying the constraints used to characterize them so their multiple resource management objectives are achieved as efficiently as possible.

Each alternative is a combination of land uses, forest management activities, and resource outputs. As such, alternatives must consider the resource production capabilities (both the high and low limitations) of the many different areas on the Forest. Each alternative is designed to manage the land to achieve predetermined goals and objectives. Some of the objectives are common to all of the alternatives, while other objectives, such as providing a given mix of timber outputs, are specific to an alternative. Several steps were involved in the development and analysis of the alternatives. These steps can be summarized as follows:

1. The I.D. team initially looked at the original 12 alternatives in the Forest Plan, and determined that all Forest Plan Amendment alternatives would be based on the 1983 preferred alternative.
2. National and regional direction, the planning ICOs, and the benchmark analyses were all used to help define a broad range of reasonable management alternatives which needed to be developed.

3. Within the established range, alternatives with different management philosophies, goals, and objectives were developed so as to reflect a wide range of scenarios for the Forest in order to maximize net public benefits.
4. Alternatives were limited in scope by the USDA decision to analyze timber management in the current Forest Plan, not to change management levels or methods for other Forest resources.
5. Resource management objectives for each alternative were formulated in terms of constraints on activities, resource mixes, output levels, etc., in order to fully characterize the purpose of the alternative. The constraints used for each alternative are explained later in this section.
6. FORPLAN was used to analyze the outputs and effects for each alternative under the various allocation and multiple resource constraints developed in preceding steps.
7. Finally, economic and resource output information from FORPLAN reports were used as input for other analyses such as job and income impacts in order to fully analyze the effects of the alternatives.

Discussion of Individual Alternatives

In the following discussion the purpose of each alternative, the criteria and assumptions underlying its development, and its accompanying constraints are presented. The constraints presented are used in the final FORPLAN formulation of the alternatives in the FSEIS.

Alternative 1A (Current "No Action" and "RPA" Alternative)

The purpose of the "No Action" alternative, as required by NEPA, is to represent the outputs and effects expected to occur if the current management direction, as provided by the Forest's approved Forest Plan, were continued. The alternative was not specifically designed to address the identified planning ICOs. Alternative 1A is the current approved Forest Plan and also serves as the RPA alternative.

Criteria and Assumptions

Alternative 1A was developed to mimic timber management under the current approved Forest Plan as far as possible.

Unique Constraints

In addition to the common constraints described earlier in Section VII, other unique constraints also were used to help achieve the objectives of this alternative. All of the constraints used in Alternative 1A were needed to simulate current management policies, land allocations, and resource output levels. The constraints are explained briefly below:

1. Constrain sawtimber harvest to 7000 MCF (31,500 MBF) annually in decade 1, as directed in the original Forest Plan. Constrain 4666.6

MCF annually to come from the OK (See FSEIS Table B-III-4) timber lands; this volume is the maximum practical sustained yield determined by the Ranger Districts. Constrain 2333.4 MCF to come from the other tentatively suited timber lands.

2. Constrain aspen timber harvesting to 875 MCF (3,500 MBF) annually in decades 1 and 2, as directed in the original Forest Plan.
3. Constrain spruce-fir timber harvests to less than 5250 MCF annually in decades 1 and 2, as directed in the original Forest Plan.
4. Constrain lodgepole sawtimber harvests to greater than 1232 MCF annually in decades 1 and 2, as directed in the original Forest Plan.
5. Constrain ponderosa sawtimber harvests to greater than 162 MCF annually in decades 1 and 2.

Alternative 1B

Alternative 1B emphasizes timber market opportunities. Timber will be supplied to meet current demand and also to encourage future growth in the industry. Alternative 1B was dropped from detailed FSEIS analysis because the volume of timber needed was too high to meet Forest Standards and Guidelines.

Alternative 1C

The purpose of this alternative is to respond to issues concerning the need to manage for an economically efficient timber program.

Criteria and Assumptions

The constraints common to all alternatives are the only ones needed to represent Alternative 1C.

Unique Constraints

None.

Alternative 1D

The purpose of this alternative is to respond to issues and concerns which emphasize maintaining the amenity aspects of the GMUG National Forest while producing a moderate level of timber.

Criteria and Assumptions

The criteria and assumptions underlying the development of the Alternative 1D are:

1. The effects of clearcutting will be kept to a minimum and will be limited to aspen and lodgepole timber.

2. Timber harvesting will be restricted to currently roaded areas and the Forest's best timber lands which are not high value scenic areas.

Unique Constraints

In addition to the common constraints described earlier, other unique constraints also were used in order to help achieve the objectives of the alternative. The constraints are explained briefly below:

1. Constrain harvesting to within a mile of a road to maintain amenity values in the backcountry.
2. Constrain tentatively suited aspen treatments to regenerate at least 488.6 acres of even-aged aspen and conifer-invaded aspen annually within OK tentatively suited timber lands. Treatment helps maintain aspen within a mile of a road by treating on a 130 year rotation.
3. Constrain timber harvesting to only OK tentatively suited timber lands.
4. Constrain spruce-harvesting to at least 3370 MCF using the selection method, and keep spruce-fir sawtimber supply level at the 13 year average conifer sawtimber harvest level. This will maintain amenity values by limiting spruce-fir harvesting to selection only.

Alternative 1E

Alternative 1E was developed in a public forum of interested user groups facilitated by the Keystone Center. While Alternative 1E does not have the consent of all the parties, Alternative 1E is the result of the public forum. Alternative 1E meets both sawtimber demand and a high level of aspen demand to the extent that is practical.

Criteria and Assumptions

The criteria and assumptions underlying the development of alternative 1E are:

1. Aspen POL waferwood production was based on a downward adjustment of the acres available for harvest, 2.5 MCF per acre, and a 90 year rotation. The aspen acres available for harvest were derived from the DSEIS tentatively suited aspen acres, minus 10% for aspen on steep slopes, minus 13.5% for financially inoperable timber sales, minus 4.5% for politically sensitive areas, minus 10% for micro-site timber harvesting silvicultural problems, plus a 3% adjustment for overestimating the acres of aspen on steep slopes and the acres of aspen not physically suited for timber production (see Figure B-VII-1).
2. Adjustments to conifer timber stands available for harvest were not made since the proposed harvest level (6,578 MCF) is significantly below maximum harvest levels (14,042 MCF).
3. Adjustments to aspen sawtimber production levels were not made because the financially efficient haul routes for the aspen sawtimber mills in

the Paonia area are different from haul routes to Olathe, and aspen sawtimber demand is less than 6% of aspen POL demand. Adjustments were made to convert 300 MBF of aspen sawtimber production to aspen POL production for products other than waferwood. The remaining 1,334 MBF would remain as sawtimber, but would be made up on incidental aspen volume in sales that were otherwise conifer sawtimbers sales.

4. Alternative 1E is made up of 3 Noninterchangeable Components (NICs) (sawtimber, conifer POL, and aspen POL).

Figure B-VII-1

Determination of Alternative 1E Aspen POL Harvest

Tentatively Suited Aspen Acres	384,702
Steep Slopes (10% decrease)	-38,436
Net	<u>346,266</u>
Best estimate of aspen lands that are clearly uneconomical due to distance from roads, access costs, distance from Olathe, and small size this decade (13.5% decrease)	-51,940
Net	<u>294,326</u>
Best estimate of aspen lands that are politically so sensitive (such as viewsheds, domestic water supplies, etc.) that entry in this decade would not be appropriate (4.5% decrease).	-17,313
Net	<u>277,013</u>
Best estimate of lands that would not be harvested in this decade due to environmental concerns such as bogs, steep slopes and limitations of the Standards and Guidelines (10% decrease).	-38,782
Net	<u>238,231</u>
Best estimate of lands that have been reduced from the tentatively suited base that will be tentatively suited once the on-the-ground conditions are known (15% of the aspen acres withdrawn due to steep slopes (38,436 acres) and 15% of the aspen acres determined to be "Not Physically Suited" (33,674 acres) = 72,110 acres x 15%). (3% increase)	+10,816
Net acres available for entry in alternative 1E =	<u>249,047</u>
249,047 acres x 2.5 MCF/acre / 90 years = 6,917 MCF/Year	

Unique Constraints

In addition to the common constraints described earlier, other unique constraints also were used to achieve Alternative 1E objectives. Alternative 1G is a subset of Alternative 1E. All timber harvesting which would occur under Alternative 1G would also occur under Alternative 1E. Alternative 1E also has additional timber harvests. The constraints below are for the FORPLAN analysis of Alternative 1E which is incremental to Alternative 1G. See Alternative 1G

for the remaining constraints. To make Alternative 1E, one must take the Alternative 1G FORPLAN analysis and add to it the incremental Alternative 1E FORPLAN analysis below.

The constraints are explained briefly below:

1. Constrain conifer sawtimber production to Keystone agreement levels to an increment over Alternative 1G of 1911.4 MCF/year.
2. Constrain aspen sawtimber production to 296 MCF/year to meet DSEIS estimates of aspen sawtimber demand. This allows for converting 300 MBF of aspen sawtimber sales to POL sales. Historically 300 MBF has been sold as sawtimber, even though the sales were destined for miscellaneous POL products. The adjustment corrects this problem, and the 300 MBF will be part of the 6,917 MCF Keystone agreement harvest level.
3. Constrain timber harvests on OK lands to zero so the Alternative 1E incremental FORPLAN analysis will not duplicate the analysis already completed in Alternative 1G.
4. Constrain Alternative 1E incremental aspen POL production to 3,167 MCF/Year in decades 1-2 (6,917 MCF for waferwood minus 3750 for Alternative 1G is 3167). This provides aspen POL production at a conservatively-estimated upper limit which helps meet the needs of local waferwood industry at slightly below the expected demand level of 7750 MCF/Year.
5. Constrain spruce-fir post and pole harvesting for zero volume in decades 1-2. This keeps the model from harvesting small size timber to obtain water benefits.

Alternative 1F

This alternative was developed to respond to issues and concerns related to managing a financially efficient timber program and to create a net cash flow from the timber program. Alternative 1F was analyzed with FORPLAN but was dropped from detailed analysis in FEIS chapter II because the harvest volume was zero, at current average timber prices, there are no financially efficient timber sales on the Forest. The Alternative was not displayed in FSEIS Chapter II as timber related outputs are zero.

Criteria and Assumptions

Only financially efficient timber lands will be scheduled for harvest. Decade one will have a positive net revenue for variable timber sale receipts and costs.

Unique Constraints

In addition to the common constraints described earlier, other unique constraints also were used to help achieve the objectives of this alternative. The constraints are explained briefly below:

1. Net undiscounted timber revenues must be greater than or equal to zero in all decades.
2. The Alternative 1F objective function is to maximize net discounted timber receipts. Water benefits were not part of the Alternative 1F objective function.

Alternative 1G

The purpose of this alternative is to respond to public comments on the DSEIS and to provide for a level of timber harvesting that District managers believe is practical while also maintaining local timber-industry-dependent jobs.

Criteria and Assumptions

The criteria and assumptions underlying the development of Alternative 1G are:

1. District managers are best able to lay out a realistic timber harvesting program.
2. Timber harvesting will be restricted to those lands which have average or better productivity, lands which lack environmental problems or hazards, and lands which are not in high-value scenic areas.

Unique Constraints

In addition to the common constraints described earlier, other unique constraints also were used to help achieve the objectives of this alternative. The constraints are explained briefly below (See also FORPLAN data set in Forest Planning Records R-1920.2-1-p):

1. Constrain Ponderosa Pine harvesting to at least 222.2 MCF per year in decades 1 and 2. Districts indicated that 1,000 MBF (222.2 MCF) is the maximum Ponderosa Pine harvest level they can sustain.
2. Constrain timber harvesting on slope greater than 40% to zero in all decades. Too many environmental problems exist to allow harvesting on steep slopes.
3. Constrain timber harvesting to only OK tentatively suited timber lands and 5,400 acres of high-road-cost aspen acres. Timber harvesting should be limited to the Forest's most productive and least expensive lands with the fewest environmental problems and to lands which are not sensitive scenic areas.
4. Constrain sawtimber harvesting to 4666.6 MCF (21,000 MBF) annually on OK lands. District managers indicated that 21,000 MBF per year is the maximum sustained harvest level possible on OK timber lands while still meeting the Forests Standards and Guidelines and allowing for spatial problems encountered while laying out timber sales.
5. Constrain spruce-fir post and pole harvesting for zero volume in decades 1-2. This keeps the model from harvesting small size timber to obtain water benefits.

6. Constrain aspen POL harvesting to 13,764 acres in decades 1 and 2. Constrain aspen POL harvesting to 37,000 MCF in decades 1 and 2 on OK lands, and 1500 MCF in decades 1 and 2 on HR lands. Constrain aspen POL harvesting to 540 acres in decade one on HR lands. The Forest originally estimated that a 1,370 acre per year aspen harvest program was the maximum sustained aspen harvest level on OK lands, while continuing to meet the Forests Standards and Guidelines and allowing for spatial problems encountered while laying out timber sales. District managers questioned this amount and the Forest reanalyzed the acres available timber sale by timber sale and discovered that it would be very difficult to harvest 13,700 acres from OK lands over the next ten years. The Forest then reviewed lands identified as not appropriate for timber production to see if additional lands could be found. The Forest found 540 acres of decade one timber sales in the high-road-cost lands which were just past the cut-off point from being classified as appropriate lands (\$36.00/MBF in road construction costs) and had no other social or environmental problems. District estimates indicate that the rotation age of the high-road-cost timber sales would be 100 years. Therefore, 5,400 acres were added to the suited aspen timber base of Alternative 1G. The total Alternative 1G decade 1 harvest with the two new high-road-cost timber sales is 13,764 acres and 153,764 MBF. The volume was then rounded to the nearest million board feet to 154,000 and the acres were rounded to the nearest 10 acres to 13,760 (See Forest Planning Files; Alternative 1G Development; R-1920-2-2-e for the final Alternative 1G aspen ASQ and aspen harvest acres).
7. Constrain conifer POL timber sales to 610 MCF/year (2,440 MBF) which is the maximum harvest level Districts can achieve in the first decade. Constrain decades 2-15 conifer POL harvests to 1,111 MCF/year (4,444 MBF) which is the estimated level of demand.
8. Constrain all OK acres and the 5,400 acres of high-road-cost aspen to be suited acres to match up with the District mapping effort which determined appropriate acres and the two decade 1 aspen timber sales on high-road-cost lands for Alternative 1G.

Alternative 1H

Alternative 1H responds to a request from the State of Colorado to examine an aspen harvest level of 2,000 acres per year. It also provides an intermediate aspen harvest level in the range of alternatives between Alternative 1G and Alternative 1E. Alternative 1H is exactly the same as Alternative 1G except Alternative 1H harvests 630 more acres of aspen annually.

Criteria and Assumptions

The criteria and assumptions underlying the development of alternative 1H are:

1. The additional 630 acres of aspen harvesting cannot come from the OK lands, but must come from the less productive, more expensive, and valuable, scenic areas on the Forest. Alternative 1G aspen harvest levels represent the maximum sustained level on the OK lands.

Unique Constraints

In addition to the common constraints described earlier, other unique constraints were used in order to help achieve the objectives of this alternative. The constraints are explained briefly below:

1. Constrain harvesting on OK acres to zero so the Alternative 1H FORPLAN analysis will not duplicate the Alternative 1G FORPLAN analysis.
2. Constrain conifer and steep slope timber harvesting to zero for all decades.
3. Constrain aspen POL harvesting to 630 acres and 1,750 MCF (7,000 MBF) in lands other than OK lands. The 630 acres plus the Alternative 1G 1,376 make 2,006 acres. The 7,000 MBF volume represents approximately 11 MBF/acre which is the average volume per acre of aspen POL timber sales.

SECTION VIII - EFFECTS OF BENCHMARKS, CONSTRAINTS, AND ALTERNATIVES

Introduction

Section VIII provides a detailed discussion of the outputs and effects of the FSEIS alternatives. The focus is on the tradeoffs between different alternative levels and mixes of goods and services when addressing the planning ICOs. The discussion identifies outputs and effects of each alternative, the consequences of the constraints, and the relationship of each alternative to the Max PNW benchmark. The analysis facilitates identification of the alternative which maximizes net public benefits. As such, the comparative analysis provides a basis for Planning Step 8: selection of the preferred Forest Plan Amendment alternative for the Forest.

Evaluation Of Constraints

The multiple resource management objectives associated with a particular benchmark or land management alternative are represented in FORPLAN as a combination of constraints and an objective function. The objective function guides the FORPLAN model in the selection of the most economically efficient combination of prescriptions, activity scheduling choices, and resource output levels which satisfy the multiple resource management objectives of a particular benchmark or alternative.

The maximization of present net value was subject to satisfying all of the constraints used to represent resource management objectives not provided for by the economic efficiency objective function. The imposition of constraints often, but not always, reduced the PNW for a particular alternative. The PNW given up in response to achieving the objectives of a constraint is referred to as the "opportunity cost." Changes in resource outputs such as timber harvest volume, net revenue, or jobs is referred to as "physical tradeoffs." In order to isolate the opportunity costs and physical tradeoffs associated with a particular constraint, or set of constraints, a specialized tradeoff analysis was conducted, separate from the alternative analysis.

During the benchmark analyses, constraint sets needed to analyze the production potential of the Forest were developed and evaluated. For example, MRs were evaluated to determine the magnitude of their tradeoffs.

The results of the analyses of MRs and legal and policy constraints are presented in Section VI of Appendix B. The results will not be discussed here.

Tradeoffs Among Alternatives

In discussing physical tradeoffs (differences) between alternatives, the focus is on resolution of ICOs, resource outputs, socioeconomic effects, and the overall tradeoffs incurred in attempting to address the ICOs. The environmental consequences of the alternatives are presented in detail in Chapter IV of the FSEIS and will not be discussed or summarized here.

Each Alternative responds to the Indicators of Responsiveness (See FSEIS Table II-10) differently. The following discussion summarizes the tradeoffs between Present Net Value (PNV) and the differences in the more important Indicators of Responsiveness.

To provide a framework for assessing the tradeoffs, the ICOs which help to identify the significant differences between the alternatives and their respective quantifiable indicators of responsiveness are discussed in Chapter II of the FSEIS. The quantitative responsiveness of each of the alternatives to the ICOs is presented in Table II-9 of the FSEIS. The discussion in Appendix B will center around the incremental tradeoffs and opportunity costs between alternatives and their effects on PNv.

Table B-VIII-1 summarizes variable total timber related benefits, costs, and PNv associated with the maximum efficiency benchmark (Benchmark 3A) and the 6 alternatives analyzed in detail. In the table the maximum efficiency benchmark is used as a reference point in comparing the alternatives. The benchmark represents the maximum net economic return available if priced resources on the Forest were managed solely to maximize PNv. Table B-VIII-1 also presents differences in PNv, total benefits, and total costs between successional ranked alternatives and provides an estimate of the net economic value of priced resource outputs that must be foregone if a lower ranked alternative is selected over a higher ranked one. For additional information, FEIS Table II-7 breaks down the components of discounted benefits and costs.

Differences In Total Timber PNv

The total timber related PNv of the alternatives ranges from a high of \$1.22 million for Alternative 1C to a low of \$-15.08 million for Alternative 1E. Alternative 1E has the greatest discounted benefits and costs of all the alternatives. Alternative 1D has the lowest discounted benefits and discounted costs. Except for Alternative 1D, decreasing PNv relates well with increasing total timber harvest at current average timber prices. Alternative 1D has a lower relative PNv due to its lower water benefits from extensive selection harvesting in spruce-fir.

Table B-VIII-1

Present Net Value & Discounted Benefits & Costs by Alternative Millions of 1982 Dollars

BENCHMARK/ ALTERNATIVE	TOTAL PNV 4%	TIMBER CHANGE	DISCOUNTED BENEFITS	4% CHANGE	DISCOUNTED COSTS	4% CHANGE
Benchmark 3A*	\$2.83		\$48.44		\$45.62	
Alternative 1-C	\$1.22	\$-1.61	\$27.33	\$-21.11	\$26.12	\$-19.50
Alternative 1-A	\$-3.29	\$-4.51	\$35.42	\$8.09	\$38.72	\$12.60
Alternative 1-G	\$-6.58	\$-3.29	\$36.34	\$0.92	\$42.92	\$4.20
Alternative 1-H	\$-10.43	\$-3.85	\$39.44	\$3.10	\$49.88	\$6.96
Alternative 1-D	\$-12.71	\$-2.27	\$11.23	\$-28.21	\$23.94	\$-25.94
Alternative 1-E	\$-15.08	\$-2.37	\$59.44	\$48.21	\$74.52	\$50.58

* The benchmark displayed above is for comparison of tradeoffs and opportunity costs. It is not considered a viable alternative because it lacks demand cutoff points.

Differences In Variable Timber Related Costs

Costs considered in the PNW calculation include all costs for timber management, plus costs for timber purchaser road credit. Non-Forest Service costs such as logging, hauling, road maintenance, brush disposal, or erosion control costs paid by timber purchasers are not included. Timber related costs can be seen in FSEIS Table II-6. Alternative 1E has the largest cost, greatest ASQ, and lowest PNW while the lowest costs are in Alternative 1D which also has the lowest ASQ. Changes in costs between alternatives are mainly due to changes in the level of timber management and new road construction. Generally, the higher the ASQ the greater the cost with the exception of Alternative 1G. Alternative 1G has a slightly higher ASQ (10%) than Alternative 1A, yet has an annual total timber cost which is slightly lower (6.5%). Alternative 1G was designed to harvest timber on the Forest's best timber lands, while Alternative 1A with its higher sawtimber ASQ was forced to harvest timber from less desirable timber lands.

Differences In Total Timber Related Benefits

The total timber related "discounted benefits" for each alternative are the sum of the present values of timber and water outputs. All other benefits remained constant for all alternatives. Table B-VIII-1 indicates that Alternative 1E has the highest alternative benefit at \$59.44 million; the lowest total benefit is realized in Alternative 1D with \$11.23 million. Benefits from timber management and associated water augmentation account for total timber related benefits. The reduction in total benefits from Alternatives 1E through 1D can be explained by the changes in the timber program among the alternatives except for Alternative 1D. Alternative 1D has reduced water benefits from extensive selection harvesting in spruce-fir.

Other Economic Effects

Forest Receipts

Net returns to the U.S. Treasury, or "net cash flows," are defined as the difference between the total dollar receipts expected from an alternative and the total budget required to implement the alternative. FSEIS Table II-9 displays the timber net cash flows (net receipts), budget costs, and receipts, by alternative, for the first through the fifth decades. The alternatives are ranked in order of decreasing decade-one-net-timber receipts. Net timber receipts are negative for all alternatives at current average prices. Alternative 1C has the greatest annual decade-one-net-timber receipts at \$-585,000, while Alternative 1E has the lowest net timber receipts at \$-1,822,000. Generally net timber receipts is inversely related to timber harvest level. Minor differences occur in Alternatives 1D and 1G. Alternative 1D is a little more expensive per board foot due to the use of selection harvesting and Alternative 1G is a little less expensive because it concentrates harvests on the Forest's best timber lands.

Forest Budget

Total timber related budgets are displayed in FSEIS Table II-6. Total timber budget costs range from a high of \$2,856,000 for Alternative 1E, to a low of \$1,007,000 for Alternative 1D. The more timber harvested, the greater the cost.

Employment & Income

Changes in timber volume offered have the potential to affect local employment and income levels. In estimating the impacts of the alternatives, the economic base of an eight-county area was considered; this region consisted of two economic impact areas: EIA 214 & EIA 215. EIA 214 comprises of Delta, Mesa, Montrose, Ouray, and San Miguel Counties. EIA 215 comprises of Gunnison, Hinsdale and San Juan Counties. The largest sector within the area's economic base is mining followed by the services sector. Forestry, fisheries and other agriculture makes up less than 2% of the total income of EIAs 214 & 215. The economy of the area has historically been tied to the National Forest through grazing, mining, logging, and, more recently, tourism. Logging and processing of forest products has remained relatively constant while the overall population has increased and diversified. Thus, the local timber industry has become a smaller proportion of the economy. While the Forest's timber harvest program is not absolutely vital to community growth and development, the timber program is still a significant contributor to the local economy.

FSEIS Table II-6 displays the changes in total employment and total personal income within the ten-county area by alternative. The income and employment analysis was broken down into two parts: income and employment related to the local waferwood industry and income and employment related to the local sawtimber industry.

The local waferwood industry consists of a single mill which handles roughly half the woodfiber processed in the Forest vicinity and provides approximately 350 jobs and \$5,900,000 in income. The alternatives will either provide enough woodfiber for the waferwood plant or not and 353 people will either continue to make \$5,900,000 in income or they will not. Waferwood effects were therefore determined by relative risk related to the level of aspen POL timber harvesting in each alternative. Alternative 1E has the least risk of losing the waferwood industry and Alternative 1C has the highest risk. One of the major tradeoffs of the alternatives is whether or not Forest-dependent-employee-income generated by the local waferwood industry is worth a below cost timber sale program, and, if it is, by how much of a deficit.

The local sawtimber industry consists of many mills and incremental changes are more likely in this industry than in the waferwood industry. Therefore incremental job and income effects are displayed for each Alternative. The actual effects are dependent on two factors: first the local sawtimber industry can actually utilize the volume proposed in each alternative; second, when Forest supplies of timber are reduced below industry needs, additional sources of sawlogs will not be found. Alternative 1D will provide the lowest level of sawtimber jobs and income at 191 jobs and \$2,100,000 income. Alternative 1E will provide the highest level of sawtimber jobs and income at 359 jobs and \$4,000,000 in income.

Payments To Counties

Each year local counties receive 25% of gross Forest receipts, plus payments in lieu of taxes (PILT) funds. PILT payments are calculated on the greater amount of an adjusted population/acreage dollar ceiling minus previous year 25% of gross receipts payments or a simple ten cents per acre. Ten different counties receive PILT and 25% of gross receipts from the Forest. Counties generally

receive a share of 25% of gross receipts according to the proportional acres of land on the Forest within each county. Counties also receive similar payments from other Federal land management agencies. The total payments counties receive is a combination of a share of all Federal land management agency gross receipts and the acres of Federal land within each county. Table B-VIII-2 below summarizes acres of Forest land and all Federal agency payments.

Table B-VIII-2

Percent Of Forest By County & All Agency Payments To Counties
1982 Dollars

County	Percent of Forest	All Agency Minimum County Payment	All Agency Actual County Payment	All Agency Payment Above Minimum
Delta	6.49%	\$231,350	231,350	\$0
Garfield	0.07%	\$563,889	563,889	\$0
Gunnison	40.77%	\$270,062	276,162	\$ 6,100
Hinsdale	5.99%	\$ 19,290	82,008	\$62,718
Mesa	15.58%	\$771,605	771,605	\$0
Montrose	10.32%	\$501,543	501,543	\$0
Ouray	4.31%	\$ 81,019	81,019	\$0
Saguache	10.59%	\$165,895	225,035	\$59,140
San Juan	0.07%	\$ 34,722	34,722	\$0
San Miguel	5.82%	\$131,548	155,006	\$23,892

The total county payment from Federal lands is the sum of the PILT and 25% of gross receipts and will be referred to as "Total County Payment". For six of the Forest's counties Total County Payments will not change with increasing or decreasing timber revenue. These counties are Delta, Garfield, Mesa, Montrose, Ouray, and San Juan counties and they contain 37% of total Forest acres. To increase Total County Payments for these counties total Forest timber receipts would have to increase by approximately \$12,000,000. For the six fixed payment counties, payments would have to increase by 1,107,000 in order for the PILT payment to be reduced to the minimum ten cents an acre and allow for increasing county payments with increasing Federal Agency receipts. The amount of Forest receipts needed to deliver \$1,107,000 is $\$1,107,000 * (1/.25) * (1/.37)$ or \$12,000,000. Alternative 1E in comparison has the highest gross timber receipts of all the alternatives at \$1,030,000.

The Total County Payments for Gunnison, Hinsdale, Saguache, and San Miguel counties do change with changing gross timber receipts. These four counties contain 63% of the Forest. The reason these counties are affected is because their PILT payments are based on a straight 10 cents an acre which is not affected by previous year 25% of gross receipts payments. As a result, an increase (decrease) in timber harvest volume or an increase (decrease) in timber price generally means more (less) revenue to these four counties, except for the special case of Gunnison County. Table B-VIII-3 displays the variable payment effects of the Alternatives.

Table B-VIII-3

Effects of Alternative Timber Programs on Variable Payment Counties

County	Alt 1A	Alt 1C	Alt 1D	Alt 1E	Alt 1G	Alt 1H
Gunnison	\$71	\$65	\$65	\$106	\$68	\$76
Hinsdale	\$10	\$ 7	\$ 6	\$ 16	\$10	\$11
Saguache	\$18	\$13	\$11	\$ 27	\$18	\$20
San Miguel	\$10	\$ 7	\$ 6	\$ 15	\$10	\$11

The effects on variable payment counties can be evaluated by assuming that Alternative 1A is the current situation. The effects are straight forward unless decreased payments are severe enough to change the method of calculating PILT payments from 10 cents an acre to a population/acreage adjusted figure like the one used to calculate payments for fixed payment counties. No matter how great the decrease, Counties will receive the minimum total payment identified in Table B-VIII-2.

Within the scope of the alternatives, Gunnison county is on the boarder line between the two PILT calculation methods. A decrease in Forest gross receipts of approximately \$60,000 ($\$6,100 * [1/.25] * [1/.4077]$) will mean Gunnison County total payments are subject to a population/acreage ceiling, in which Gunnison will receive a flat rate of approximately \$270,000 in total payments annually. Gunnison County is the only county in which the method of calculating PILT payments would change. Table B-VIII-3 was adjusted to minimum level payments for Gunnison County for Alternatives 1C and 1D. (See Payments In Lieu of Taxes Act 31 USC 1601-1607 and Forest Planning Records R-1920-2-1(x) Revised Payments To Counties Summary 5/6/91).

Break Even Timber Price

Break even timber prices were calculated for all alternatives by simply adding FORPLAN-estimated variable timber/road costs plus timber fixed costs and dividing by the total timber harvest volume. Timber break even price reflects the average Forest-wide timber price needed to make the Forest timber program or NIC component break even. The lower an alternative's break even timber price, the more efficient the alternative. Alternative 1H has the lowest break even timber price at \$43.80/MBF, while Alternative 1C has the highest break even timber price at \$54.20/MBF. Generally, the more timber harvested and the greater the proportion of harvesting occurring on the Forest's best timber lands (appropriate- OK acres), the lower the timber break even price will be. A higher timber harvest level offsets fixed timber costs, and harvesting on the Forest's best timber lands is simply cheaper.

Major Tradeoffs Among Alternatives

See FSEIS (page II-53) for a detailed discussion of the tradeoffs between the Alternatives.

IX. EFFORTS TO REDUCE COSTS & ENHANCE REVENUES

Reducing Costs

Timber Sale Preparation and Administration

In an effort to be more efficient and reduce costs, the Forest has eliminated some Forest Headquarters timberstaff positions, eliminated conifer scaled sales, reduced the reforestation program, and zoned the timber jobs on most of the districts.

At this time the Forest has one of the lowest per unit output costs (for example \$/mbf) for timber sale preparation and sale administration in Region 2. This may have negative resource effects since costs have been reduced to the point, that it is difficult to do a quality resource management job.

The Forest Headquarters timber staff has been reduced from 6 people in 1984 to a current staff of two. Some of the sale preparation work was being done by a crew from the Forest Headquarters. This crew was eliminated. The work and responsibilities were assigned to the districts.

The Forest Headquarters timber staff did include a silvicultural position. This position was eliminated. The work and responsibilities have now been delegated to the districts.

The forest in 1985 eliminated conifer scaled sales and switched to tree measurements sales. This eliminated at least one scaling position. It also eliminated the need to train and keep a certified backup scaler.

Starting in 1985, most districts zoned their timber jobs. Instead of seven districts having their own timber staff, there are four zoned timber groups doing the work. This reduced the need to maintain the number of certified cruisers, sale administrators and silviculturists on the Forest. In addition to the cost savings, the jobs can now be done with more experienced and trained personnel.

Scaled timber sale contracts are being used for aspen sales because they are more cost efficient for POL sales than tree measurement sales. The aspen sales are weight scaled and are based upon a pre determined weight factor. Individual logs do not have to be scaled. Cost savings occur because the cruising standards are lower for a "scaled sale" than a tree measurement sale.

Reforestation

Artificial reforestation, a major program expense in the past, has been reduced substantially over the past few years.

The use of silvicultural harvest methods that relies on natural regeneration is predominately used. Site preparation for natural and some seeding is still being done to some extent when needed. Planting is being done primarily in insect infested ponderosa pine stands, when a natural seed source does not exist. The forest does not plan on any clearcutting, except in aspen, some lodgepole pine stands and insect infested ponderosa pine stands when needed. This cuts down the need for planting.

Enhancing Revenues

The standard rate for aspen POL was increased from the regional rate of \$37.5 per MCF to \$55 per MCF. This provided an increase in revenues.

Studies are now being conducted to raise the aspen POL minimum rate to as much as \$152 per MCF which would be the break even price for the Forest's aspen program and would cut Alternative 1G net timber losses approximately in half. FSEIS Table II-8 contains a more detailed analysis of proposed aspen POL minimum rate changes. While the FSEIS contains analysis of aspen POL price increases, the decision to increase aspen POL prices will be made apart from the Forest Plan Amendment decision.

Market forces have been increasing sawtimber prices without the Forest having to set minimum rates. While sawtimber prices ranged between \$7 to \$14 per MBF from 1983 to 1987, sawtimber prices averaged in excess of \$34 per MBF in 1989 and 1990. This corresponds to a reduction in timber sale volume under contract versus annual timber harvest levels during these two time periods and to increased competition for timber sales.

APPENDIX C

ADMINISTRATIVE APPEAL DECISION LETTERS

APPENDIX C

ADMINISTRATIVE RECORD

Appendix C provides the reader with background material relevant to the appeal of the original Forest Plan by the Natural Resources Defence Council (NRDC) and the subsequent decision letters. They provide the necessary information which the Forest considered in dealing with this one aspect of the reanalysis. There are five documents included in the appendix and they are placed chronologically:

1. Record of Decision for the Forest Plan, signed September 29, 1983.
2. The Decision Letter of September 10, 1984, signed by Chief Peterson and addressed to the NRDC. There is also a cover letter included from the Regional Forester to the GMUG Forest Supervisor
3. The Secretary of Agriculture Administrative Decision letter to the Chief signed by Douglas W. MacCleery and dated July 31, 1985. This is known as the "MacCleery Letter"
4. A follow-up letter from the Secretary's Office dated September 11, 1985 and signed by MacCleery
5. A letter from the Chief's Office signed by James C. Overbay, Deputy Chief, on June 23, 1988 which provides direction to the Service concerning implications of the "MacCleery Letter".

RECORD OF DECISION
for
USDA Forest Service

Final Environmental Impact Statement

GRAND MESA, UNCOMPAHGRE AND GUNNISON NATIONAL FORESTS
LAND AND RESOURCE MANAGEMENT PLAN

Delta, Garfield, Gunnison, Hinsdale, Mesa, Montrose,
Ouray, Saguache, San Juan, and Miguel Counties, Colorado

I. INTRODUCTION

This Record of Decision documents the approval of the Land and Resource Management Plan (Plan) for the Grand Mesa, Uncompahgre and Gunnison National Forests. The Plan is a long-range program for all natural resource management activities and establishes management requirements for the Grand Mesa, Uncompahgre and Gunnison National Forests. The Plan identifies the resource management practices, the projected levels of production of goods and services and management, and the location where resource management activities may occur on the Grand Mesa, Uncompahgre and Gunnison National Forests.

The Plan was prepared under the 1979 National Forest Management Act (NFMA) implementing regulations (36 CFR 219). It will be implemented under the revised 1982 regulations. When the Plan is scheduled to be revised it will be brought into conformance with the 1982 NFMA implementing regulations.

All NFMA citations are to the 1982 implementing regulations unless otherwise noted.

The Plan provides for the coordinated multiple-use of outdoor recreation, range, timber, watershed, minerals, wildlife and fish, and wilderness in the management of the Grand Mesa, Uncompahgre and Gunnison National Forests, resulting in sustained yields of goods and services for the benefit of the American people.

Major features of the Grand Mesa, Uncompahgre and Gunnison Forests Plan are:

A. EXPECTED FUTURE CONDITION

The Plan identifies the desired condition of the Grand Mesa, Uncompahgre and Gunnison National Forests to be achieved in the future. This is presented in the Goals section of Chapter III of the Plan page III-2. The goal statements describe a desired condition to be achieved some time in the future. Goals are timeless but form the basis for developing objectives (36 CFR 219.3).

B. OBJECTIVES

The Plan establishes management objectives for the Grand Mesa, Uncompahgre and Gunnison National Forests. These objectives are presented in Chapter III of the Plan, pages III-5 through III-13. The objectives are statements of measurable results that respond to pre-established goals (36 CFR 219.3). These objectives are quantitatively displayed as outputs that could be provided or activities that are expected to occur. The objectives were derived through a systematic interdisciplinary process used to develop alternatives summarized in Chapter II of the Final Environmental Impact Statement (EIS). It must be understood that there is no warranty or guarantee that these objectives will be achieved. These objectives are contingent upon many factors such as budget levels, changes in laws and regulations, or natural disasters.

C. MANAGEMENT REQUIREMENTS

The Plan establishes management requirements which control and govern activities on the Grand Mesa, Uncompahgre and Gunnison National Forests. These begin on page III-14, in Forest Plan. The Plan includes Forest Direction and Management Prescriptions. Forest Direction details overall management requirements that apply to the entire Forest during Plan implementation. Forest Direction is applied in addition to the management requirements of Management Prescriptions. The Plan assigns Management Prescriptions to specific land areas within the Forest. The management requirements provide the specific management practices and intensity of practices which may occur to attain goals and objectives and to address issues and concerns. All practicable means to avoid or minimize environmental harm are incorporated in the Forest Direction and Management Prescriptions. Mitigation is summarized in Chapter IV, Final EIS, page IV-134. Forest Direction and Management Prescriptions are displayed in Plan, Chapter III page III-10. The Plan map displays the Management Prescription assigned to each management area of the Grand Mesa, Uncompahgre and Gunnison National Forests.

D. MONITORING AND EVALUATION

The Plan establishes monitoring and evaluation requirements to identify how well the goals and objectives of the Plan are met. The monitoring procedure is displayed in Plan Chapter IV.

E. IMPLEMENTATION

The Plan includes proposed schedules for implementing Forest Service activities. These schedules are in Plan Appendices A through E, G, J, K, M through P, and R. The Forest Supervisor has authority under this Plan and 36 CFR 219.10(e) to change the proposed implementation schedules to reflect differences between proposed annual budgets and actual appropriated budget levels.

F. WILDERNESS SUITABILITY OR UNSUITABILITY

The Plan reflects my recommendation on suitability or unsuitability of the Fossil Ridge Wilderness Study Area (WSA) and the Cannibal Plateau Further Planning Area (FPA) for inclusion in the National Wilderness Preservation System.

G. WILDERNESS AREAS COVERED IN THIS RECORD OF DECISION

The Plan includes management direction for the entire La Garita and Raggeds Wildernesses. This includes 24,164 acres of the La Garita administered by the Rio Grande National Forest and 16,578 acres of the Raggeds administered by the White River National Forest. The San Juan National Forest Plan will include management direction for the entire Lizard Head Wilderness. This includes 18,600 acres managed by the Grand Mesa, Uncompahgre and Gunnison National Forests. The White River National Forest Plan will include management direction for the Maroon Bells-Snowmass Wilderness and the Collegiate Peaks Wilderness. This includes 18,840 acres and 48,000 acres respectively, managed by the Grand Mesa, Uncompahgre and Gunnison National Forests.

The Plan establishes broad direction and does not attempt to anticipate and resolve every short-term problem or conflict which may arise in managing the Grand Mesa, Uncompahgre and Gunnison National Forests. A key feature of the Plan is that it can be adjusted through rescheduling, amendment, or revision.

The Final EIS describes a proposed course of action and alternatives to the proposed action for managing the land and resources of the Grand Mesa, Uncompahgre and Gunnison National Forests. The Final EIS describes the environment to be affected and discloses the potential environmental consequences of implementing the proposed action and alternatives to that action. Preparing an EIS is required by the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations Title 40, Code of Federal Regulations, Parts 1500-1508 (40 CFR 1500-1508); and in the implementing regulations of the National Forest Management Act Title 36, Code of Federal Regulations, Part 219 (36 CFR 219). Forest Plan preparation was also guided by the Multiple Use-Sustained Yield Act of 1960.

There were no changes or modifications to the Proposed Land and Resource Management Plan, related to this decision, that are not included in the Plan.

II. ISSUES AND CONCERNS

Public issues, management concerns and management opportunities were identified in the scoping processes in the planning effort. These were used to formulate planning questions displayed in the Final EIS, page I-5. Planning questions were formulated from issues, concerns, and opportunities to ensure the planning effort was geared to problem recognition and analysis, to alternatives for action on manageable problems, and to monitoring for reporting back to the public. In addition, the expected future condition of the forest as it relates to each planning question is discussed beginning on page II-76 of the Plan.

The issues, concerns, and management opportunities identified at the beginning of this planning process did not substantially change. One new issue emerged during review of the Draft EIS. This issue was expressed as a request to increase timber harvest volume to justify the large capital expenditure required to establish a modern processing facility. This issue became a facet of Planning Question 8 - How should Forest products be managed to supply commercial and non-commercial demands on the Forest?

III. WILDERNESS STUDY AREA RECOMMENDATION

I recommend the Fossil Ridge WSA as unsuitable for inclusion in the National Wilderness Preservation System. A legislative EIS for Fossil Ridge will be prepared based on information and analysis disclosed in the Final EIS for the Plan and an analysis of the records of the public hearings. This legislative EIS with my recommendation will receive further review and possible modification in the offices of the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States. After the President transmits the Administration's final recommendation to Congress, the legislative EIS will be filed with the Environmental Protection Agency and distributed to the public. Until Congress acts, the Fossil Ridge WSA will be managed to maintain its existing wilderness character while still permitting existing uses. Livestock grazing and dispersed motorized recreation will continue and range structural improvements can be maintained or constructed.

This is a recommendation in response to a legislative mandate in the Colorado Wilderness Act of 1980, (PL 96-560) and is not appealable under 36 CFR 211.18. The existing wilderness character of the area and its potential for inclusion in the National Wilderness Preservation System will be maintained as provided for in Section 105(c) of the Act.

IV. DECISION

I have reviewed the affirmative and opposing views and environmental consequences of the Plan and the alternatives to the Plan which were disclosed in the Final EIS. I have also reviewed the public issues and management concerns identified during the scoping process for this Plan. These issues and concerns are disclosed in the Final EIS Chapter I, Page I-10 through I-17.

Additionally, I gave particular attention to public comments on the Draft EIS presented in Chapter VI of the Final EIS. The planning actions described in the NFMA regulations (36 CFR 219.5, (1979)) have been completed and are properly documented. Similar requirements appear in the 1982 regulations (36 CFR 219.12).

It is, therefore, my decision to approve Alternative 1 as described in the Final EIS as the Plan for management of the Grand Mesa, Uncompahgre and Gunnison National Forests.

The Continental Divide National Scenic Trail location is displayed on the Forest Plan map. The trail from Tincup to Monarch Pass will be identified in the Pike and San Isabel National Forest Plan.

The recommendations on lands available for mineral leasing are displayed on the Forest Plan map and discussed in Chapter III of the Plan. Lease issuance on National Forest System land on which the "No-Surface Occupancy" stipulation applies does not guarantee ground access across adjacent National Forest System land without further environmental analysis. In addition, lease issuance does not guarantee access across adjacent land which is not part of the National Forest System.

Existing roads will be open, restricted, closed, or obliterated to manage public and administrative road traffic. Forest Service road management is determined by maintenance costs, resource management objectives, and user safety. Keeping roads open and maintained provides benefits related to access for firewood collection and dispersed recreation, but has impact on wildlife seclusion and road maintenance and land management costs. All management activities are designed to be compatible with areas open, restricted, or closed. All newly developed roads with a single purpose will be closed to non-project public use. Exceptions may be made where justification for public use of the road and associated land area is demonstrated.

Neither the East River nor the Taylor River are eligible for further consideration for inclusion in Wild and Scenic River System.

The Tabeguache (350 acres) and Escalante Creek (61 acres) areas are recommended for establishment as Research Natural Areas. Their management includes preserving, protecting, studying, and interpreting the biotic communities.

I also recommend that 13,599 acres of the Cannibal Plateau Further Planning Area are suitable for inclusion in the National Wilderness Preservation System. The remaining 18,391 acres are unsuitable and allocated to non-wilderness uses.

A Legislative EIS for Cannibal Plateau FPA will be prepared. This legislative EIS will be submitted to the Washington Office of the Forest Service. It with my recommendation will receive further review and possible modification in the offices of the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States. If the wilderness recommendation is affirmed, the President will transmit the Administration's final recommendation to Congress. The legislative EIS will be filed with the Environmental Protection Agency and distributed to the public.

This decision is fully described in Chapter III of the Plan.

V. REASONS FOR THE DECISION

A. INTRODUCTION

This section describes the significant considerations on which the Plan decisions are based. These considerations are described in the Issues, Concerns, and Opportunities as reflected in the Planning Questions and identified throughout the planning documents. They are also described in response to comments made on the Draft EIS and proposed Plan, as documented

in the Final EIS, Chapter VI. The paramount considerations leading to the decisions, outlined in Section IV above, are discussed below.

Most of the results of this decision will not be apparent in the immediate future to the casual observer, as similar activities have been occurring for many years. The key for achieving the goals and objectives of this Plan is a healthy Forest. Many results of this decision will occur over the long-term through vegetation treatment. The Plan provides for using vegetation treatment as a practical and efficient method to achieve many goals and objectives.

Vegetation treatment is a management technique for administering the natural resources to attain the overall goal of a healthy, vigorous forest. It is used to manage existing plant communities to best meet vegetation needs and resource goals and objectives. Vegetation treatment can also increase productivity of the land; it is guided by the management requirements of the Plan.

When vast acreages of forest cover are uniformly mature, wildlife diversity is limited to the relatively few species which are dependent on mature forests. Burning, cutting, or other vegetation treatments will increase vegetation diversity which will provide a diversity of wildlife habitat and wildlife species.

Treatment also reduces the amounts of unwanted fuels which can increase potential for wildfire. Mature and overmature forests are more susceptible to epidemic insect attack. An attack can spread over large areas creating undesirable effects. Insect or disease epidemics create conditions similar to large burns or clearcuts, but with the additional potential for wildfire due to the additional fuels created. If age, size class, and species diversity are enhanced the risk of wide spread epidemic is reduced.

Water yield maintenance and increase also result from vegetation treatment. Other outputs and effects as diverse as maintaining visual quality and firewood availability are closely related to the amount of vegetation treated.

B. REASONS

Following are specific factors considered in selecting Alternative 1. They are grouped in eight categories. No single factor determined the decision. Rather, all factors were considered in balance in making the decision. Based on a consideration of all factors, including monetary and non-monetary costs and benefits, I feel the decision will result in the greatest benefit to the public.

Compatibility With Other Public Agency Goals

The goals of other public agencies which could be affected by National Forest management were requested early in the planning process and used to help develop the alternatives in the Draft EIS. Comments received on the Draft EIS identified objectives which were not previously revealed were considered in the Final EIS. See Chapter VI Final EIS for agency letters.

Compatibility with other agency goals was evaluated in terms of dependency on the land and resources managed by the Forest.

--The habitat requirements for increased numbers of deer and elk on the Forest discussed by the Colorado State-Wide Comprehensive Plan for National Forests will be met in all alternatives except 4, 6 and 9.

--The 1981 State of Colorado Outdoor Recreation Plan (SCORP), prepared by the State of Colorado, recommends that the Forest provide additional opportunities for picnicking, four-wheeling and downhill skiing. The Plan and the other alternatives in the EIS meet projected demand for these activities through the year 2030.

--The State of Colorado has registered three areas to be included in the Colorado Natural Areas Program; i.e., the Mt. Emmons Iron Bog, Uncompahgre Fritillary Butterfly Habitat and Slumgullion Earthflow. The Slumgullion Earthflow is recognized as a Colorado Natural Area in the Forest Plan. The area recommended by the State for Fritillary Butterfly Habitat is within the Big Blue Wilderness which offers adequate protection. Therefore, the Forest Plan will not recognize the habitat as a natural area.

--The Mt. Emmons Iron Bog will be protected from activities detrimental to its maintaining the habitat of *Drosera rotundifolia* L. This is a small carnivorous round-leaf sundew plant located in peaty or wet acidic soils. Projected mining activities on adjacent private land may affect the bog. Close coordination will be necessary when and if mining begins.

--The Bureau of Land Management (BLM) is concerned that their management options may be limited on BLM land adjacent to National Forest System land where access to potential oil and gas leases is restricted on the National Forest. The BLM feels they may be forced to allow access in areas where roads may be undesirable. This occurs in all alternatives. This is a potential problem that could effect the BLM. The Forest Service will continue to work with the BLM to provide access where it is appropriate. The Forest Service may initiate a change in leasing recommendations after the BLM has identified areas across which they will not permit access.

--Local counties have used live streams as a source of gravel. Forest requirements for management of riparian areas will curtail this traditional use. See Prescription 9A of the Plan, Page III-238.

--Some counties feel that if the Forest Service does not continue to meet increased demand for developed recreation, it will result in an adverse effect on the counties economic goals. The proposed action will meet 96 percent of projected demand for developed recreation by the year 2000 with a gradual decrease to 79 percent by 2030. That portion of demand not met by National Forest System land is expected to be met by the private sector and other government agencies. If this occurs, the anticipated adverse effects will not materialize. Alternatives 6 and 8 would achieve the same capacity levels as the proposed action. Alternatives 2, 5 and 7 would meet 91 percent of demand by the year 2000 and 58 percent by 2030. Alternatives 3 and 4 would meet 100 percent of demand through 2030 and Alternative 9 would not meet any increases in projected demand beyond 1986.

--During informal consultation, the Fish and Wildlife Service, USDI, indicated the Plan analysis should consider three additional threatened and endangered fish species. These species are: Colorado Squawfish, *Ptychocheilus lucius* ; Humpback Chub, *Gila cypha* ; and Razorback Sucker, *Xyrauchen texanus* . None of the fish have been found on the Forest and the identified occupied and historical ranges are far removed from the Forest.

Stability of Industries Needed to Produce Regional Outputs of Goods and Services

A major consideration in selecting Alternative 1 is that it provides for future increases in those National Forest resources and uses which contribute to local industries. The principal industries relying on National Forest resources and use are tourism, timber, and ranching.

All of the alternatives and the proposed action would meet the demand for dispersed recreation, wilderness use, and downhill skiing throughout the 50 year planning horizon. The total estimated demand for developed recreation will not be met by Alternative 1. Total recreation use and related employment and income in the tourism industry is expected to increase.

Alternatives 4, 6 and 9 would offer less timber volume than that which is needed to maintain the stability of local timber industry. The proposed action and other alternatives would maintain the timber industry dependent on the Forest.

The Plan and other alternatives improve range conditions, and increase grazing capacity and permitted livestock beyond the current level.

Social and Economic Stability

Effects on minority groups and civil rights, distribution of goods and services, payment of taxes, receipts, payments to local governments, and income and employment were considered in selecting Alternative 1.

Management requirements in the Plan are expected to enhance the social stability of the area surrounding the Grand Mesa, Uncompahgre and Gunnison National Forests. The Plan does not introduce any change which would significantly alter the existing social structures. It promotes continuation of the existing lifestyles which are dependent upon use and management of the Grand Mesa, Uncompahgre and Gunnison National Forests. Emphasis on vegetation treatment, through commercial activities, and the continued emphasis on livestock grazing will help maintain the existing rural lifestyle predominant in the planning area. Provisions for ski area expansion, meeting total demand for dispersed recreation, and meeting a substantial portion of the increased demand in developed recreation should benefit the tourism industry.

The Plan will have a positive impact on the following:

--Minority groups and Civil Rights - Effects will result from internal Forest Service programs in which members of minority groups and women are hired directly by the Agency, and external opportunities in which

members of minority groups and women could work on Forest Service projects through contracts and permits. Currently, approximately ten percent of the dollar value of all contracts are set aside as "8A" contracts, reserved by the Small Business Administration to develop minority and women contractors. Much of the employment generated by tourism, which is expected to increase, is service oriented. These jobs are traditionally filled by a high percentage of women.

--Distribution of goods and services - There will be substantial increases in livestock grazing, timber production, and recreation; including downhill skiing and hunting and fishing. Water production and wildlife winter range carrying capacity will be increased.

--Payment of taxes - There will be a direct correlation between increased levels of economic activity generated by implementation of the Plan and the amount of taxes collected by governments and provide public services.

--Receipts - Receipts collected by the Federal government will increase as a result of increased timber volume sold, increased permitted livestock numbers, and increased developed recreation.

--Payments to local governments - Local governments will benefit financially as their share of receipts is increased commensurate with increased outputs.

--Income - Income in those economic sectors affected by implementation of the Plan will increase.

--Employment - The Plan will contribute to a stable work force as economic diversity is increased through an increase in the timber industry.

Energy Efficiency In Terms of Production And Consumption

Production energy is energy consumed in managing the resource. Consumption energy is energy consumed in using the resource. Energy efficiency is calculated by achieving the lowest possible ratio between energy consumed and units produced.

Because the Plan provides for intensive resource management and for recreation use levels which are not substantially lower than many of the alternatives with lower management intensities, it ranks Fourth highest in total energy consumption. There is an estimated 9 percent difference in energy consumption between Alternative 2 which has the least consumption and the Plan.

Response to Public Issues

Many issues raised during the Forest planning process are conflicting. Resolving an issue favorably may result in resolving another issue unfavorably from the viewpoint of the person who raised that issue. No alternative was able to favorably resolve all public issues.

The Plan provides direction to:

--Meet 100 percent of the projected demand for developed recreation in the First decade. The percent demand met will reduce to 96, 89, 82 and 79 percent in decades 2 through 5. Total developed recreation capacity is expected to increase from 744,000 RVDs in decade 1 to 1,012,000 RVDs annually in decade 5.

--Meet projected demand for downhill skiing opportunities by expanding existing sites.

--Meet the demand projected for motorized and non-motorized recreation opportunities.

--Manage approximately 17 percent of the Forest for semi-primitive non-motorized recreation. Trail management will be emphasized, 30 percent of the existing Forest trail mileage will be reconstructed during the first decade. Fifty miles will be constructed or reconstructed annually over the planning horizon.

--Emphasize primitive settings in designated wilderness.

--Recommend 13,599 acres of Cannibal Plateau FPA suitable for inclusion in the National Wilderness Preservation System. This could increase the total wilderness acres on the Forest to 515,376 acres, 17 percent of the total Forest area. The remaining 18,391 acres are allocated to non-wilderness uses. The recommendation of suitable and decision to allocate to non-wilderness use is based on the suitability analysis and disclosure of effects documented in the Final EIS. (See index in Appendix I, Final EIS for location of information.) The 13,599 acre suitable area is capable, available, and needed for wilderness based on the analysis in Chapter IV of the Final EIS. The major considerations in recommending the 13,599 acre portion suitable is the need to compliment and reduce conflicts with the recommended Powderhorn Wilderness. The remaining 18,391 acres is not needed to complement the recommended Powderhorn Wilderness and is needed to maintain the existing special uses and potential for motorized recreation (snowmobiling).

--Recommend the Fossil Ridge USA unsuitable for inclusion in the National Wilderness Preservation System. The analysis of suitability and disclosure of effects is documented in the Final EIS. The six factors used in the need analysis indicated the area is not needed for wilderness. Also, the availability analysis indicated the area is unsuitable for wilderness based on non-wilderness values foregone of which the greatest is minerals.

--Provide 590,386 acres be managed for wildlife habitat emphasis. Vegetation diversity is enhanced. Vegetation treatment through a variety of vegetation treatment methods.

--Increase National Forest System winter range carrying capacity 6 percent in the first decade. This is due to the aspen habitat management and increased prescribed burning programs. Aspen treatment will be maintained at 500 acres annually, over the planning horizon. Prescribed burning is scheduled for 5,500 acres annually after 1985.

--Increase permitted livestock grazing 5 percent, to 335,800 AUMs grazed annually over the 50-year planning horizon. Range condition will be good with a stable trend. Grazing capacity is increased by increasing investments in structural and non-structural range improvements.

--Schedule for offer 350 million board feet of timber for sale during the period 1984 through 1993. Some commentators on the Draft EIS commented that the timber harvest levels were too high, others that they were too low. See Planning Question 8, Chapter VI of the Final EIS. To respond to local